COMMONWEALTH MYCOLOGICAL INSTITUTE

C. A. B.
15 JUN 1953
FILE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXXII MAY 1953

SCHULZ (G.). **Ein mykologisches Verfahren zur Bewertung fungicider Grundiermittel mit bläuewidriger Wirkung.** [A mycological procedure for the evaluation of fungicidal primary coats of paint with an anti-blueing action.]—*Holz a. Roh- u. Werkst.*, 10, pp. 353–356, 1 fig., 1 diag., 1 graph, 1952.

At the Institute for Applied Mycology and Timber Preservation, Hann.-Münden, Germany, a method was devised for testing undercoats of paint incorporating a fungicide (0·2 to 5 per cent. pentachlorophenol in these tests) [*R.A.M.*, 32, p. 95] effective against blueing fungi, represented by *Scopularia* [*Leptographium*] *phycomyces*. Lines are drawn with the fungicide across inoculated, kiln-dried pine sapwood boards, 10 by 5 by 0·9 cm., and the effect is assessed three weeks later, using the degree of inhibition of fungal growth on the lines as a criterion. The fungicidal threshold of pentachlorophenol in linseed oil and test benzene ranged from 2 to 2·5 per cent.

THEDEN (GERDA). **Über die Tiefe der Wirksamkeit einer Holzschutzbehandlung mit Quecksilberchlorid.** [On the depth of effectiveness of a protective wood treatment with mercuric chloride.]—*Holzforschung*, 6, 1, pp. 1–6, 5 figs., 1952. [English summary.]

At the Material Testing Centre, Berlin-Dahlem, a spruce pole was impregnated with mercuric chloride by the kyanization method [*R.A.M.*, 31, p. 263 and next abstract]. Of the four fungi used in inoculation experiments to determine the extent of protection conferred, *Coniophora cerebella* [*C. puteana*] was the least and *Lentinus lepideus* the most sensitive, while *Poria vaporaria* and *Lenzites abietina* were intermediate. A copper iodide test (described in *Holzforschung*, 6, 1, pp. 6–9, 1952) proved much more effective than the ammonium sulphide procedure in gauging the depth of penetration of the chemical.

THEDEN (GERDA) & BECKER (G.). **Versuche über Abgabe und Wirkung von Quecksilberchlorid in Dampfform.** [Experiments on the emission and action of mercuric chloride in vapour form.]—*Holzforschung*, 6, 1, pp. 9–12, 1 fig., 1952. [English summary.]

Pine sapwood blocks impregnated with mercuric chloride [see preceding abstract] emitted vapour toxic to *Merulius lacrymans*. In another series of tests the preservative effect of the vapour extended from treated blocks to an underlying untreated lot, conferring partial protection against infection by *Poria vaporaria*; *Coniophora cerebella* [*C. puteana*] was inhibited in only one instance.

KEINO (K.). **Effects of copper salts upon the mycelial growth of wood-destroying fungi. II. The destruction of the wood impregnated with copper salts by Poria vaporaria and Trametes sanguinea. III. Keeping the toxicity of copper salts against Poria vaporaria.**—*Bull. For. Exp. Sta. Meguro* 54, pp. 1–44, 2 pl., 21 graphs., 1952. [Japanese with English summary.]

Test blocks of *Pinus densiflora* 2 by 2 by 4 cm. were impregnated with ammonium cupric sulphate solution by the full cell process at concentrations of 0·6, 1·2, 2·5, 5, and 10 per cent., placed on agar cultures of the wood-destroying fungi *Trametes sanguinea* [*Polystictus sanguineus*: *R.A.M.*, 31, p. 156; 32, p. 157] and *Poria vaporaria* [see preceding abstract], and incubated at 26° C. for 100, 200, and 300 days, after which the degree of destruction was estimated by the loss of weight and compressive strength, the cellulose and lignin contents being determined by a standard method.

Cellulose destruction by *P. vaporaria* was accelerated by all the solutions but 10 per cent., while for *Polystictus sanguineus* rotting was accelerated only by 0·6 per cent. The untreated wood rotted by *Poria vaporaria* and the uninoculated controls treated with 2·5 and 5 per cent. solutions showed marked cellulose destruction during the first 100 days. Suggestions are made as to the chemical changes responsible for this acceleration of cellulose decomposition. Ammonium cupric sulphate is reduced to basic copper sulphate, which was present in large amounts in the uninoculated blocks impregnated with a 5 per cent. solution and caused a decrease in compressive strength. Cellulose consumption was particularly rapid in rotted, treated blocks towards the end of the test period, after which lignin had accumulated in the residue in large quantities together with the copper component which had not been washed out by cold sulphuric acid solution.

Growth of *P. vaporaria* was inhibited by 0·2 per cent. copper arsenate [ibid., 31, p. 311], 0·1 per cent. copper arsenite [ibid., 28, p. 317], and 0·1 per cent. sodium arsenite when tested by the Petri dish method and by 1 per cent. copper arsenate and 0·5 per cent. copper arsenite ammoniacal solutions by the test block method.

DUNCAN (CATHERINE G.). **Evaluating wood preservatives by soil-block tests: 5. Lignite-tar and oil-tar creosotes.**—Reprinted from *Proc. Amer. Wood Pres. Ass., 1952*, 6 pp., 2 graphs, 1952.

Further work in this series at the Division of Forest Pathology, United States Department of Agriculture, Madison, Wisconsin, on the evaluation of wood preservatives by soil-block tests [cf. *R.A.M.*, 31, p. 640; 32, p. 159] demonstrated that a lignite-tar creosote, the same minus only the tar acids distilling up to 270° C., and an oil-tar creosote fortified with 2 per cent. pentachlorophenol inhibited decay by *Lentinus lepideus* on conditioned and weathered blocks.

SCHMITT (C.). **Influence de la lumière sur la résistance de plantules de Lepidium sativum L. à Botrytis cinerea Pers.** [The influence of light on the resistance of *Lepidium sativum* L. seedlings to *Botrytis cinerea* Pers.]—*C.R. Acad. Sci., Paris*, 235, 3, pp. 258–260, 1952.

The reactions of garden cress (*Lepidium sativum*) seedlings to inoculation with *Botrytis cinerea* depended on their distance from the source of light, those at 10 cm., exposed to an intensity of 2,000 lux, being resistant (132 successful tests out of 204), and those at 30 cm. (200 lux) susceptible (198 out of 201). Resistance was manifested by arrest of the intercellular progress of the hyphae in the hypocotyl, deposit of melanic pigments on the walls, and premature development of a cortical cambium.

MARKHAM (R.). **Physicochemical studies of the Turnip yellow mosaic virus.**—*Disc. Faraday Soc., 1951*, 11, pp. 221–227, 2 pl., 1 diag., 2 graphs, 1951.

Some physical properties of the two proteins isolated from turnip and Chinese cabbage plants affected by turnip yellow mosaic virus [*R.A.M.*, 29, pp. 71, 485; 32, p. 161] and methods of separating them by the difference in their particle weight are described from studies at the Molteno Institute, University of Cambridge.

MEYER (J. K.). **Practijkervaring met de bestrijding van knolvoet.** [Practical experience in the control of club root.]—*Maandbl. LandbVoorlDienst*, 9, 8, pp. 311–314, 1952.

Club root (*Plasmodiophora brassicae*) is stated to have spread widely on swedes in the Hengelo district of Holland [*R.A.M.*, 26, p. 370], where the crop is intensively cultivated, through neglect of cultural precautions. For instance, crop rotation is not practised, the fields are dressed with contaminated manure, infected refuse is ploughed under, and susceptible varieties are grown. In 1947 the author's advice was sought by a farmer whose crop had been a total failure owing to the development of the disease in epiphytotic form during the previous two years, following the gradual accumulation of infective material in the soil, the pH of which was 5·8 and required the application of lime. In 1948 and 1949 the resistant Jobe variety was grown, but still a considerable proportion of the crop contracted club root. In the autumn of 1949 healthy roots were selected and seed from these plants was sown in comparative plots with the original Jobe; the percentages of infection in the two series were 16·4 and 36·7 respectively. In 1950, moreover, the seed of 36 selected strains was sown in duplicate, of which ten proved highly resistant, with a maximum of 2·5 per cent. infection. In further trials the decrease of club root in these selections, as compared with the standard, ranged from 14 to 65 per cent. The trials were still continuing in 1952.

KVIČALA (B. A.). **Studie o virové nekrose Růžičkovité Kapusty.** [The study of virus necrosis of Brussels Sprouts.]—*Sborn. čsl. Akad. zeměd.* [*Ann. Acad. tchécosl. Agric.*], 22, 3–5, pp. 586–600, 1950. [Abs. in *Biol. Abstr.*, 25, 12, p. 3356, 1951.]

Brussels sprouts, not commonly grown in Czechoslovakia, are subject to a necrosis caused by a virus that is either a strain of or identical with *Brassica* virus 1 [cabbage black ring spot virus: *R.A.M.*, 30, p. 297; 31, p. 474; 32, p. 113] or *Marmor brassicae* [turnip mosaic virus: ibid., 31, p. 369; 32, p. 54]. Brussels sprouts show leaf deformation, small necrotic rings with a necrotic central spot, sometimes surrounded by a chlorotic halo, and general leaf-mottling. The necrosis spreads to the petioles and stems, leaf drop occurs, and the tops of the plants become necrotic, particularly young ones. The virus is readily transmissible by sap inoculation and by the aphids *Brevicoryne brassicae* and *Myzodes* [*Myzus*] *persicae*. Infectivity increases greatly after preliminary fasting and decreases with increasing length of feeding period. The virus is probably transmitted to perennial crucifers, which are a potential source of infection for the next year. The eradication of cruciferous weeds and diseased plants and repeated spraying against aphids are recommended for control.

TAUBITZ (A.). **Verminderung der Vergilbungschäden an Rüben.** [Reduction of yellows damage to Beets.]—*Z. Zuckerind.*, N.F., 2, 2, pp. 57–58, 1952.

This is a summary of the available information on the symptomatology, economic importance, etiology, and control of beet virus yellows in Germany [*R.A.M.*, 32, p. 162], with special reference to the insecticidal treatment of the aphid vectors [*Myzus persicae* and *Aphis fabae*], e.g., with organic phosphorus preparations, and steckling cultivation in the Eifel mountains (Rheinland) [ibid., 31, p. 535].

Coons (G. H.). **Sugar Beet virus yellows in United States.**—Abs. in *Phytopathology*, 42, 6, p. 341, 1952.

The occurrence of beet yellows virus in Michigan, Colorado, Utah, Oregon, and California has been definitely established by diagnostic tests with anti-yellows sera obtained from phytopathological laboratories at Lisse, Holland, and Versailles, France, as well as by sap and aphid (*Myzus persicae*) transmission experiments. The identity of the disease known in California as 'Salinas yellows' with beet yellows virus has also been demonstrated by aphid transmission and serological tests. The virus strains so far investigated cause yellowing, thickening, and brittleness of the outer leaves of sugar beet but no veinlet-clearing.

[An amplified version of this paper, comprising details of the experiments and a discussion of the results, appears in *Plant Dis. Reptr*, 36, pp. 356–363, 1952.]

Stewart (D.). **The development of Cercospora leaf spot resistant monogerm Sugar Beets.**—Abs. in *Phytopathology*, 42, 6, p. 344, 1952.

The F_2 monogerm segregants of crosses between multigerm sugar beet resistant to leaf spot (*Cercospora*) [*beticola*] and the susceptible monogerm SLC 101 [*R.A.M.*, 28, p. 613] showed marked variations in vigour and seed size. The disease reactions of the parental lines were repeated in some of the F_3 monogerm progenies exposed to moderately severe leaf spot infection, while others showed marked segregation for disease resistance. Eight lines combining vigour, large seeds, and resistance to leaf spot have been selected for increase and hybridization.

Bockmann (H.). **Über Auflaufschäden an Erbsen.** [On emergence damage to Peas.]—*Z. PflKrankh.*, 59, 7–8, pp. 241–248, 1952. [English summary.]

A tabulated survey is given of experiments at the Kiel-Kitzeberg (Schleswig-Holstein) branch of the Biological Institute and on local farms to determine the relation of crop rotation to the infection of emerging pea shoots by fungi, especially *Ascochyta* [*pisi* and *A. pinodella*: *R.A.M.*, 31, p. 584 and next abstract] and *Fusarium* spp. [ibid., 32, p. 164]. Experiments in 1950 and 1951 yielded the following emergence percentages: (1) peas after peas 42, after summer rape 44·5, after red clover 45·3, and after cereals 35·8; (2) peas after peas 54·8, potatoes 58·3, opium poppy 63·8, and cereals 72·3; (3) peas after peas 25·8 and potatoes 47·5; (4) peas after peas 58·8 and cereals 62·8.

An abridged report is presented on the results of pot experiments from 1948 to 1951. Assigning a figure of 100 to peas after peas, the percentages of emergence in eight rotational sequences were as follows: peas after potatoes 150, barley 119·7, wheat 116·5, fallow 115·4, flax 113·7, rape 111·6, beet 104·1, and red clover 100. In another trial involving three crops beginning with peas, the emergence of the third consecutive pea crop was arbitrarily fixed at 100 and the percentages in the remaining sequences were as follows: peas—fallow—peas 32·9, beet as the intermediate crop 76·5, red clover 85·9, barley 88·2, wheat 97·2, potatoes 97·9, and rape 101·6. The conclusion is drawn that the sowing of peas, not immediately preceding peas but the season before that, exerted an adverse effect on emergence. Further data from four-year rotation experiments in the greenhouse completed in 1951 corroborate the conclusion that the reduction of emergence by fungi in pea stands is due in the first place to the repeated cultivation of the crop on the same site.

Sörgel (G.). **Über die Ursachen der unterschiedlichen Resistenz verschiedener Erbsensorten gegenüber den Krankheitserregern Ascochyta pisi Lib., Ascochyta pinodella Jones und Mycosphaerella pinodes (Berk. et Blox.) Stone. I. Vergleichende Untersuchungen zum Verhalten der Pilze auf einer stark und einer schwach anfälligen Sorte.** [On the causes of the differential resistance of

diverse Pea varieties to the pathogens *Ascochyta pisi* Lib., *Ascochyta pinodella* Jones, and *Mycosphaerella pinodes* (Berk. & Blox.) Stone. I. Comparative studies on the behaviour of the fungi on a highly and a slightly susceptible variety.]—*Züchter*, 22, 1–2, pp. 4–26, 3 figs., 20 graphs, 1952.

At the Plant Breeding Institute, Quedlinburg, Germany, the resistance of the Graue Buntblühende [grey, variegated-flowered] sugar pea to the foot rots caused by *Ascochyta pisi*, *A. pinodella* [see preceding abstract], and *Mycosphaerella pinodes* [*R.A.M.*, 31, p. 584] was shown to be due to the presence of a phytoncide in the testa, decoctions of which produced an effect in six hours, reducing and retarding mycelial and pycnidial growth in agar cultures. The changes in the hyphae were irreversible. No such effect was produced by testa decoctions from the susceptible Kelvedon Wonder. The degree of inhibition was dependent on the total nutrient content of the testa. *M. pisi* proved to be the most sensitive of the three fungi tested and *A. pisi* the least so.

Hubbeling (J.). **Selectieschema's bij zelfbevruchters in het bijzonder bij Sla- en Snijbonen in verband met vereiste kwaliteit, ziekteresistentie, beschikbare ruimte en arbeidskrachten.** [Selection projects for self-pollinators, especially salad and French Beans, in relation to the requisite quality, resistance to disease, and available space and man power.]—*Versl. Studiekr. PlVered., Wageningen, 1950*, pp. 326–338. [? 1950. Received January, 1953. Mimeographed.]

Most of the bean (*Phaseolus* spp.) varieties cultivated in Holland are insufficiently resistant to the three virus diseases occurring in the country, namely, 'roll' mosaic [bean mosaic virus: *R.A.M.*, 27, p. 456; 31, p. 218], 'severe' mosaic, and stipple streak [? tobacco necrosis virus: ibid., 26, p. 277]. The two former are disseminated by winged aphids, while the last-named persists in the soil after the harvesting of infected crops and is spread mainly by rain drops during cool, windy weather. All varieties are more or less susceptible to stipple streak, but most scarlet runners are resistant to the mosaic viruses. The apparent resistance to bean mosaic virus of certain American varieties, such as U.S. No. 5 Refugee, is an expression of hypersensitivity and breaks down at temperatures above 20° C., which induce the development of the brownish black discolorations known as 'black vascular disease' [cf. ibid., 29, p. 284]. So severe was this form of bean mosaic virus in 1947 that alternative parents were sought and found among samples from Switzerland, Sweden, and France. 'Severe' bean mosaic virus was also prevalent in 1947 and 1949, especially near plots of diseased gladioli, which appear to be one of the principal sources of infection [cf. ibid., 31, p. 435]. Very susceptible bean varieties contracted top necrosis and moderately susceptible ones severe mosaic, while the resistant reaction probably represents a form of tolerance.

The agent of grease spot disease [*Pseudomonas medicaginis* f.sp. *phaseolicola*: ibid., 27, p. 456] is the only important bacterial pathogen of beans in Holland [C.M.I. map No. 85]. Field resistance to the disease is so high in a number of salad and French bean varieties that damage from this source can be discounted.

Experiments have been proceeding since 1948 in the development of lines combining disease resistance with other desirable qualities. In part of the F_4 population of a cross between Wachs Rheingold (resistant to bean mosaic virus and the black vascular form of the disease, and to top necrosis) and Eerste Pluk resistance to bean mosaic was homozygous, while three-quarters of the plants derived from the remainder were healthy and a quarter diseased.

Mathur (R. S.). **Function of spore matrix in Colletotrichum lindemuthianum.**—*Indian Phytopath.*, 4, 2, pp. 152–155, 1951. [Received 1952.]

Studies at the Division of Mycology and Plant Pathology, Indian Agricultural

Research Institute, New Delhi, demonstrated that sporulation in the gamma strain of *Colletotrichum lindemuthianum* [*R.A.M.*, 29, p. 488] was stimulated by the spore matrix (the mucilaginous substance in which the spores are embedded) obtained by soaking heavily sporulating cultures in distilled water, centrifuging and filtering the resultant spore suspension, and adding the filtrate to non-sporing cultures. Pea and bean [*Phaseolus vulgaris*] extracts also induced spore production. The matrix may thus be instrumental in aiding the spread of bean anthracnose.

MARCUS (C. P.). **A new physiologic race of rust (Uromyces phaseoli-typica Arthur) causing losses to Beans in Maryland.**—Abs. in *Phytopathology*, 42, 6, p. 342, 1952.

From 1948 to 1950, inclusive, considerable losses among late bean [*Phaseolus vulgaris*] crops in Kent County, Maryland, were caused by a mixture of two physiologic races of *Uromyces phaseoli-typica* [*U. appendiculatus*], namely, 26 [*R.A.M.*, 31, p. 467] and a new one designated 82. The rust is believed to overwinter in the uredo stage under local conditions, the few surviving uredospores building up a sufficient population to produce late summer epiphytotics. No aecidia were found in the field.

ZAUMEYER (W. J.). **Another strain of Alfalfa mosaic systemically infectious on Beans.**—Abs. in *Phytopathology*, 42, 6, p. 344, 1952.

A new strain of lucerne mosaic virus producing primary and systemic necrotic and severe mottle symptoms on beans [*Phaseolus vulgaris*: *R.A.M.*, 29, p. 29] was isolated from lucerne in Idaho. It differs markedly from all previous strains of the virus except the yellow dot strain [ibid., 31, p. 266],which induces more veinal necrosis than primary spotting and a milder systemic mottle than the new strain. Moreover, cucumber and red clover are susceptible to the former but not to the latter. On Pinto beans the new strain forms irregular, reddish brown primary lesions, 3 to 4 mm. in diameter, with pale green centres. Necrosis of the veins, petioles, and stem ensues and the trifoliate leaves develop mottling and necrotic lesions, followed by large, yellow blotches. Varieties of the Bountiful type display chlorosis and mottling but no necrosis. The physical properties of the virus conform to those of the type strain. Inactivation occurred in 10 minutes at 65° to 70° C. and in 72 hours at 18° and a dilution of 1 in 4,000 was withstood.

BREMER (H.). **Salatmosaik. Ein Sammelbericht.** [Lettuce mosaic. A cumulative report.]—*Z. PflKrankh.*, 59, 7–8, pp. 275–277, 1952.

Stating that lettuce mosaic virus is probably one of the principal reasons for the decline of the crop in important vegetable-producing regions of Germany [*R.A.M.*, 8, p. 323], the author presents the essential information, gleaned from 20 contributions to the literature, on the symptomatology, geographical distribution, etiology, transmissibility, and control of the disease [cf. ibid., 32, p. 7].

GERSTNER (W.). **Untersuchungen über den Sellerieschorf.** [Studies on Celery scab.] —*Dtsch. Landw.*, 3, 8, pp. 418–420, 1 fig., 1952.

Field observations have shown that celery scab (*Phoma apiicola*), a source of heavy losses to German growers [*R.A.M.*, 19, p. 508], occurs in a particularly severe form after a cool, damp summer, and in the greenhouse the inoculation of seedlings in sandy soil with a 40 per cent. moisture-holding capacity resulted in 100 per cent. infection. At the Aschersleben (Saxony) Phytopathological Institute seedlings were inoculated on transplanting with spore suspensions of the fungus in batches of 30 at four-day intervals from May until the middle of September. At harvesting the heaviest infection was found to occur on the roots of plants

inoculated in May and June, decreasing thereafter to nil. Hence it was concluded that the later transplanting is effected, the lower will be the incidence of scab, and this assumption was confirmed by a test in which plants of the same age inoculated on 10th and 23rd May, 14th June, and 3rd July developed, respectively, 77, 38, 9, and 3·4 per cent. scab. Seedlings inoculated while still in the frame showed no external symptoms of the disease on transplanting, but on harvesting the results were similar to the foregoing, i.e., the earlier the inoculation, the heavier the infection, so that the pathogen must have entered the host and established itself without being able to cause any damage during the summer months. It has, in fact, been shown that the fungus produces no toxins until stimulated to do so by the advent of favourable weather conditions, and its presence, therefore, is readily tolerated by the host.

P. apiicola was definitely shown not to be seed transmissible [cf. ibid., 11, p. 91], but 13 out of 14 seedlings planted in March, 1951, in pots of infested soil which had been buried in the ground since the previous December, contracted the disease. An important preventive measure, therefore, is the collection and destruction of all plant debris at harvesting. In the seed-bed this practice, insufficient by itself to eliminate all risk of infection, may be supplemented by soil sterilization with steam or formalin, which is, however, too costly for large-scale use. Spraying with fungicides failed to reduce the incidence of infection, and a four-year crop rotation appears to be the sole practicable means of combating the pathogen. Besides carrots, parsley, parsnips, and caraway [*Carum carvi*], already known as hosts, the fungus also infects dill, fennel [*Foeniculum vulgare*], chervil [? *Anthriscus cerefolium*], lovage [*Ligusticum scoticum*], coriander [*Coriandrum sativum*], and aniseed [*Pimpinella anisum*], which should be excluded from the rotation. In a preliminary experiment the application of boric acid at dosages of 10, 15, and 20 kg. per ha. reduced the amount of natural infection from 33·6 to a minimum of 15·9 and a maximum of 25 per cent.

Tjallingii (F.). **Problemen bij het kweken van een Agurkenras ongevoelig voor mozaiekziekte.** [Problems in the breeding of a Gherkin variety non-susceptible to mosaic disease.]—*Versl. Studiekr. PlVered., Wageningen, 1950*, pp. 306–315. [? 1950 Received January, 1953. Mimeographed.]

Breeding gherkins for resistance to cucumber mosaic virus in Holland [*R.A.M.*, 29, p. 491] presents great difficulties, and the F_1 of crosses between the resistant Tokyo and the susceptible commercial variety Baarlose Niet-plekker failed to reach an acceptable standard. However, the F_2 (self-pollinated F_1) comprised a very large number of types ranging from quite tolerant to very susceptible. Although a factorial analysis proved impracticable, it is inferred from the available data that neither tolerance nor susceptibility is dominant, and that at least three genes are concerned in the production of a tolerant reaction.

Sill (W. H.) & Walker (J. C.). **A virus inhibitor in Cucumber in relation to mosaic resistance.**—*Phytopathology*, 42, 7, pp. 349–352, 1952.

In the course of studies at the Department of Plant Pathology, University of Wisconsin, Madison, on the relative concentration of cucumber virus 1 [cucumber mosaic virus] in resistant and susceptible varieties by the method of local lesion assay in cowpea [*R.A.M.*, 32, p. 164], it was ascertained that healthy and infected cucumber plant extracts were highly inhibitive to the virus. The inhibitor occurred in green and dead leaves, cotyledons, stems, etiolated seedlings, roots, seeds, fruits, and the complete flowers of all the varieties tested (comprising the resistant MR 20, Ohio 31, and Kanmore, and the susceptible National Pickling, Chicago Pickling, and Maine No. 2), but was almost or quite absent from the corollas. Extracts

from young chlorotic leaves and yellow areas of mottled foliage, which presumably contained only small amounts of the inhibitor, showed high virus concentrations. Extracts from green areas in mottled leaves and fruits and from entire mottled leaves of cucumber plants, as well as from healthy watermelon and spinach plants, were highly inhibitive, and those from muskmelon, squash, vegetable marrow, cowpea, tobacco, *Nicotiana glutinosa*, and tomato moderately or slightly so. Although the relation of the inhibitor to resistance could not be determined, significance is attached to the rough inverse correlation in diseased plants between the amount of chlorotic tissue, in which inhibitor content was low and virus concentration high, and the degree of varietal resistance.

Rot resistant Yam may be developed.—*Seed World*, 71, 9, p. 47, 1952.

It is hoped that the development of certain sweet potato seedlings resistant to black rot [*Ceratocystis fimbriata*: *R.A.M.*, 31, p. 101] at the Plant Industry Station, Beltsville, Maryland, will lead to the production of new resistant commercial varieties.

Van Slogteren (E.). **The role of the electron microscope in the investigation of plant diseases.**—*Philips tech. Rev.*, 14, 1, pp. 13–20, 6 figs. (2 col.), 1952.

The history of the application of the electron microscope to the study of plant diseases (mostly of virus origin) is reviewed and illustrated by electron micrographs previously figured elsewhere [*R.A.M.*, 30, p. 506].

Gray (R. A.). **The electrophoresis and chromatography of plant viruses on filter paper.**—*Arch. Biochem., N.Y.*, 38, pp. 305–316, 6 figs., 1952.

At the Pineapple Research Institute of Hawaii, Honolulu, tobacco mosaic virus was readily detected in the proteins of infected Turkish and White Burley tobacco plants by (*a*) electrophoresis of the proteins [*R.A.M.*, 31, p. 211] on filter paper and (*b*) paper chromatography [ibid., 31, p. 518; 32, p. 161] in 40 per cent. alcohol. The virus protein spot can be located and separated, the virus eluted, and used for infectivity tests on healthy *Nicotiana glutinosa* and *N. rustica* plants.

The proteins of tobacco plants infected by cucumber mosaic and potato Y viruses could also be differentiated from those of healthy plants by electrophoresis, but a separate virus protein component was more difficult to distinguish than in the case of tobacco mosaic virus. *Emilia sonchifolia* and *N. rustica* plants infected by tomato spotted wilt virus [ibid., 19, p. 483] did not yield proteins separable from those of uninfected plants by electrophoresis on filter paper.

When the protein components of healthy pineapple plants and those infested by mealybugs (*Pseudococcus brevipes*) [ibid., 14, p. 379] were compared by the electrophoresis method, the infested ones contained more of one protein component than the healthy.

A new method for the purification of tobacco mosaic virus is described, using 25 to 50 per cent. alcohol to remove most of the normal proteins in the leaf sap.

Walters (H. J.). **Some relationships of three plant viruses to the differential grasshopper, Melanoplus differentialis (Thos.).**—*Phytopathology*, 42, 7, pp. 355–362, 1 fig., 1952.

In further studies at the University of Nebraska, Lincoln, on the relationships of *Melanoplus differentialis* to the tobacco mosaic, potato ring spot [potato virus X], and tobacco ring spot viruses [*R.A.M.*, 30, p. 358], the admixture of buccal fluid or blood of the insect with extracts of these viruses inhibited their infectivity in

inoculation tests on appropriate hosts (*Nicotiana glutinosa*, tobacco, and cowpea for the three viruses, respectively). The inhibitory action of both fluids was shown to be reversible. The virulence of certain mixtures of tobacco mosaic virus and buccal fluid was enhanced by dilution or heat treatment. Dilution increased the infectivity of mixtures of potato virus X or tobacco ring spot with buccal fluid, and of all three viruses with blood. The inhibitor in the buccal fluid was thermolabile and not readily dialysable.

Infectivity of the three viruses was reduced within the digestive tract of *M. differentialis*, though only slightly in the case of tobacco mosaic virus, the concentration of which in the faeces of insects previously fed on infected plants was on a level with that of a 1 in 5 dilution of extracts from such plants. In the buccal fluid tobacco mosaic virus retained its infectivity for 12 hours, potato virus X for six, and tobacco ring spot for four. The blood of six out of 12 grasshoppers injected with tobacco mosaic virus remained infective for 10 days, but after 15 the blood of only one was still viruliferous.

SMITH (K. M.). **Latency in viruses and the production of new virus diseases.**—*Biol. Rev.*, **27**, pp. 347–357, 1952.

Discussing the problem of latency in plant viruses with reference to the literature, the author regards three as truly latent, namely, potato paracrinkle virus [*R.A.M.*, **9**, p. 604], dodder latent mosaic virus [ibid., **23**, p. 247], and the latent virus of sugar beet and mangold [ibid., **31**, p. 157]. To a different but related category belong viruses which attack isolated plants, sometimes severely, but are without natural means of spread and hence disappear on the death of the original host unless propagated artificially. Among them are the *Arabis* mosaic and tobacco broken ring spot viruses [ibid., **23**, p. 363], a virus disease of lovage (*Ligusticum scoticum*) [ibid., **23**, p. 346], and a mosaic of *Pimpinella saxifraga*.

Some of the available information on the latent viruses of insects and bacteria is briefly presented.

CICCARONE (A.). **Note fitopatologiche. III. Osservazioni intorno ad epifizie di Peronospora pisi (De By.) Syd. nel Casertano. IV. Osservazioni su Cercospora ariminensis Cav. V. Una 'necrosi apicale' delle Mele.** [Phytopathological notes. III. Observations on outbreaks of *Peronospora pisi* (de Bary) Syd. in Caserta. IV. Observations on *Cercospora ariminensis* Cav. V. An apical necrosis of Apples.]—*Ann. Sper. agr.*, N.S., **6**, 4, pp. 1065–1076, 5 figs., 1952. [English summaries.]

In May, 1951, extensive plantings of Serpetto peas in the province of Caserta, Italy, became infected by *Peronospora pisi* [cf. *R.A.M.*, **9**, p. 700; **28**, p. 53], which does not appear to have been recorded in Italy since 1881. Oospores were present in affected material [cf. ibid., **14**, p. 341; **15**, p. 194]. The plants had been grown from seed obtained from Holland [cf. ibid., **4**, p. 209] two years before.

A brief description is given of the cultural characters of *Cercospora ariminensis*, isolated by the author in November, 1951, from a leaf spot disease of *Hedysarum coronarium* growing near Scerni, Chieti, Italy. This appears to be the first report of the fungus from any country since 1899, when it was found on the same host near Rimini.

In July, 1951, Annurca apples growing in hilly parts of the provinces of Naples and Benevento, Italy, developed a disorder termed 'black end', characterized by a superficial black, depressed area at the distal end of the fruit round the calyx. The necrosis affected the flesh to only a very slight extent. No causal organism was found, and the condition is attributed to water deficiency and excessively high temperatures. Apples growing in the plains were not affected.

Plantesygdomme i Danmark 1950. Årsoversigt samlet ved Statens plantepatologiske Forsøg. [Plant diseases in Denmark in 1950. Annual survey compiled by the State Phytopathological Experiment Station.]—*Tidsskr. Planteavl*, 56, 1, pp. 1–59, 1 fig., 2 graphs, 1952. [English summary.]

The following information is contributed to this report [cf. *R.A.M.*, 31, p. 171] by H. R. Hansen, Anna Weber, and H. R. Kristensen. Manganese deficiency was severe in a number of localities on winter rye and wheat, causing yield reductions. Spring-sown cereals and beet were also affected to a lesser extent. Manganese sulphate was applied to the soil over large areas, mostly in the form of a 2 to 3 per cent. solution [ibid., 30, p. 600].

Copper deficiency was very common in Jutland, including places where it had not been reported for many years. The characteristic white tips were particularly noticeable in barley over a period of about ten days.

Cercosporella herpotrichoides was very prevalent on wheat and rye, the latter sustaining unusually heavy damage, with a frequent incidence of 20 to 30 per cent. infection.

Of 165 seed samples of cocksfoot grass [*Dactylis glomerata*], 24 were contaminated by *Corynebacterium rathayi* [C.M.I. map No. 156], an exceptionally high proportion. Heavy outbreaks of *Colletotrichum trifolii* on lucerne were reported from Jutland, Funen, and Zeeland [*R.A.M.*, 30, p. 232], especially on the newly introduced French varieties.

Black leg of beet and mangold (*Pythium*, *Phoma* [*betae*], and other organisms) was exceptionally prevalent and destructive in root crops as well as among seedlings [ibid., 29, p. 248]. *Botrytis cinerea* caused extensive root rot in clamps.

Potato blight (*Phytophthora infestans*) was abnormally virulent. Notwithstanding the predominantly rainy weather, protective spraying gave effective control; in ten experiments an average yield increase of 3·4 tons per ha. resulted from the application of 2 per cent. Bordeaux mixture at 800 l. per ha.

One-third of a flax crop raised from disinfected seed was destroyed by *C. lini* [*C. linicola*: ibid., 22, p. 433].

Spinach in a glasshouse was extensively damaged by foliar spotting due to *Heterosporium variabile* [ibid., 28, p. 510] originating from seed infection. The steam-sterilized soil provided ideal conditions for the growth of the pathogen.

New records for the country include a plum mosaic, which is probably nearly related to or identical with line pattern disease [peach line-pattern virosis virus: ibid., 31, pp. 245, 336]; a cherry disease with symptoms suggestive of green ring mottle virus [ibid., 30, p. 329]; currant mosaic [virus: ibid., 24, p. 197], particularly troublesome on black currant; and *Monilia* [*Sclerotinia*] *fructigena* on *Sorbus aucuparia* fruits.

Second Annual Report of the Commonwealth of Australia Scientific and Industrial Research Organization for the year ending 30th June, 1950.—Canberra, 157 pp., 1950.

In the plant disease section (pp. 28–31) of this report [cf. *R.A.M.*, 30, p. 18 and next abstract] it is stated that potato purple top wilt caused by tomato big bud virus [loc. cit.], often confused in the past with that caused by *Rhizoctonia* [*Corticium solani*: loc. cit.], which it superficially resembles, is identical in appearance with that caused by aster yellows virus in the United States [ibid., 32, p. 67]. It was prominent in the 1949–50 summer in the Canberra region. Graft transmissions to *Datura* and tomato plants were successful. In experiments against potato scab [*Actinomyces scabies*: see next abstract] at Canberra and Laws, in co-operation with the Queensland Department of Agriculture, Menominee and Ontario outyielded the standard commercial varieties and had only a third as much infection

as the non-resistant varieties. Cayuga and 1537–12 displayed similar resistance but were inferior in yield. Slight but definite resistance to pre-emergence sprout injury due to *C. solani* [loc. cit.] was again shown by Medium Brownell and Commonwealth Potato Collection 1417, which were consistently less susceptible than comparable samples of Red Warba and Russet Burbank. All the 16 Scotch potato hybrids tested at Canberra were resistant to all the *Phytophthora infestans* [ibid., 20, p. 593] isolates tested, thus indicating that only strain A [ibid., 31, p. 349; 32, p. 206], or a local strain similar to it in pathogenicity, was present in the Australian isolates tested. Apparently foliage resistance to *P. infestans* is not necessarily correlated with tuber resistance, though none of the varieties with highly resistant foliage had completely susceptible tubers, infection of the latter from artificial wound inoculations ranging from 0 to 70 per cent. of that of susceptible varieties. Kangaroo apple (*Solanum laciniatum*), a perennial native shrub, on the leaves of which abundant sporangiophores of *P. infestans* develop, may serve as a reservoir of inoculum under natural conditions. It has been demonstrated that potato hybrids with complete field resistance to the potato mosaic viruses, A, X, and Y [ibid., 32, p. 143] and with good yield and tuber quality can be developed.

Certain lines of beans (*Phaseolus vulgaris*) were found to be highly resistant to angular leaf spot [*Isariopsis griseola*: ibid., 31, p. 3], but none was immune. Some of them were also resistant to halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) [ibid., 28, p. 151; 32, p. 175] and anthracnose (*Colletotrichum lindemuthianum*) [loc. cit.], indicating that development of a dwarf, green pod type resistant to several or all of these diseases is possible. No variety of pea with any degree of resistance to bacterial blight (*Pseudomonas pisi*) [ibid., 30, p. 91] has so far been found. Soil moisture conditions and exposure to low temperatures apparently influence the manifestation of symptoms, thus, the higher the moisture content of the soil the more severe the symptoms. This is particularly so after waterlogging.

Third Annual Report of the Commonwealth of Australia Scientific and Industrial Research Organization for the year ending 30th June, 1951.—Canberra, 167 pp., 1951. [Received 1952.]

In the soil microbiology section (p. 14) of this report [cf. preceding abstract] it is stated that the results of preliminary field trials at Parndana, Kangaroo Island, Lucindale, Keith, and Urrbrae and greenhouse trials at the Waite Institute, South Australia, indicate that in addition to providing stimulation in the rhizosphere a wide range of fungi can invade the root tissues of subterranean clover (*Trifolium subterraneum*) and cause chronic but not necessarily adverse infections. Under certain conditions, such as abnormal water supply or limited phosphorus or nitrogen, particularly in lateritic soils with high phosphate-fixing power and new pastures with inadequate or misplaced phosphorus, chronic infection becomes systemic parasitism, resulting in extensive root rot and sometimes death.

In the section on plant genetics (pp. 17–18) it is recorded that high-yielding good quality potato varieties resistant to the major mosaic virus diseases [loc. cit.] have been obtained as a result of ten years' investigation of the genetics of resistance. A wide range of reaction to leaf roll virus as indicated by phloem necrosis [*R.A.M.*, 31, p. 624] is exhibited by phenotypes from different hybrid progenies. In field trials against [tomato] spotted wilt [ibid., 32, p. 105] Katahdin was highly resistant and Factor [Up-to-Date] susceptible. Two virus strains similar to bean mosaic II [? bean yellow mosaic virus: ibid., 31, p. 535], isolated from garden pea and subterranean clover, are being used on both hosts to detect resistance. In pea only one major gene appears to be necessary for this factor.

In the section on plant diseases (pp. 18–19) inconsistent results are reported for determinations of the relative rates of dissemination of potato virus X [ibid., 27, p. 222] in five potato varieties, suggesting that either invasion of the tubers is

incomplete or some means other than plant-to-plant contact is at work. A high percentage of stored tubers infected with purple top wilt [see preceding abstract] caused by tomato big bud virus [ibid., 32, p. 174] developed 'hair sprout' or 'thready eye' condition, which was also observed on some plants apparently free from the virus. The culture of tomato roots, usually unsuccessful in synthetic media, was achieved in White's medium, and roots of tomato clones with and without virus X are being grown in culture media with chemotherapeutic agents to inhibit the multiplication of the virus. Potato apical meristem dissected out aseptically grew well on a synthetic nutrient medium but roots did not. From potato stem segments undifferentiated callus tissue infected with virus X was produced on nutrient agar. When transferred to other nutrient agar with 2,4-D as a growth hormone this tissue continued to multiply and will be used in chemotherapy studies. Ontario and United States seedling 6,344 were both highly resistant to potato scab (*Actinomyces scabies*) [see preceding abstract], Russet Sebago was slightly less so, while Menominee was less resistant than in the previous season. No significant difference was observed in the amount of sprout injury caused by a pathogenic strain of *Rhizoctonia* [*Corticium*] *solani* [loc. cit.] inoculated to a potato variety grown in various types of soil ranging from infertile sand to rich, heavy alluvial loam under uniform conditions of temperature and soil moisture. Further tests of a number of potato hybrids from Scotland and Canada resistant to blight (*Phytophthora infestans*) [loc. cit.; ibid., 31, p. 626] with eight isolates of the fungus from New South Wales, Tasmania, and Victoria gave no indication that more than one strain of the fungus was present.

The results are given of field studies since 1947 on lucerne witches' broom [ibid., 32, p. 174], possibly caused by the same virus as tomato big bud. A controlled glasshouse watering experiment showed that symptom expression depends on the water supply and frequency of cutting, a high water supply and frequent cutting causing high mortality. The disease has been transmitted successfully by *Cuscuta campestris* and by grafting to potato, carrot, lettuce, petunia, *Calendula*, *Datura tatula*, *Vinca alba*, *Nicotiana glutinosa*, *N. rustica*, tobacco, *N. tabacum* var. *atropurpureum*, and *Crotalaria goreensis*.

Pasture diseases in the Ninety-Mile Plain in South Australia [ibid., 30, p. 164] were investigated in co-operation with the Division of Biochemistry and General Nutrition. Areas with very stunted plants, or almost bare, and of two distinct types with well-defined edges occurred in pastures on sandy heath soil soon after germination. Root rots due to *Rhizoctonia*, *Pythium*, and *Fusarium* spp. were found in one type.

During the routine screening of soil microflora 78 antagonistic isolates, 12 of which were actinomycetes, were obtained up to April, 1951, and preliminary selection studies are now in progress to evaluate the efficacy of actinomycetes against fungal and bacterial plant pathogens.

Studies on seedling blight of peas [*Pythium* spp.: ibid., 31, p. 459] have shown that an application of water to a damp soil after sowing may cause greater loss from seedling blight than a similar application to a dry soil. Stirring the soil immediately before sowing, to distribute the moisture evenly, results in a higher percentage emergence than from unstirred soil. There is more seedling blight in a steamed soil infested with the sand fraction of an unsteamed soil than when infested with the colloidal fraction. The pathogens were easily isolated from plates sown with the former mixture but has not yet been found on those sown with the latter. Relatively few bacteria are associated with the sand fraction but there are 30 times as many in the colloidal.

The results of two four-year experiments indicate that fallowing against wheat take-all (*Ophiobolus graminis*) [ibid., 31, p. 429] results in greater availability of soil nutrients, thus inducing greater resistance. In fertilized soil the condition of

the roots at harvest time, the grain yield, and total weight of plants were all better in soil containing a culture of *O. graminis* than in the control soil. The combination of nitrogen, potassium, phosphorus, calcium, and magnesium gave the best results over the four-year period.

Tobacco yellow [leaf] dwarf virus [ibid., 30, p. 215] and [tomato] big bud virus [loc. cit.; ibid., 32, p. 174] were transmitted from tobacco (p. 21) by grafting more readily in summer than in winter under greenhouse conditions, despite the relatively low percentage of successful transmissions. Preliminary results indicate that there are wide differences in the time intervals between grafting and symptom appearance between different species of *Nicotiana*. This factor is being used as an indicator of relative susceptibility.

New plant diseases.—*Agric. Gaz. N.S.W.*, 63, 2, p. 89, 1952.

During the period from July to December 1951, the following diseases were recorded for the first time in New South Wales: leaf spot (*Physoderma* sp.) on *Amaryllis belladonna*, anthracnose (*Colletotrichum lagenarium*) and *Fusarium solani* on cucurbits, leaf spot and crown rot (*Diplodia delphinii*) of *Delphinium ajacis* and *D. hybridum* [cf. *R.A.M.*, 30, p. 41], and [tomato] big bud virus causing purple top wilt of potato [see preceding abstract].

Proceedings of the eighth meeting of the crops and soils wing of the Board of Agricultural and Animal Husbandry in India held at Patiala from 28th to 31st March, 1950.—Delhi, 307 pp., 1952. [Received January, 1953.]

In this report [cf. *R.A.M.*, 31, p. 538; 32, p. 176] of a conference to consider the various measures necessary for increasing the production of alternative food crops and the extension and development work in agriculture in India there are many references to plant pathology problems. B. B. Mundkur (pp. 112–114) and H. S. Pruthi (p. 139) discuss the factors responsible for the consistently low yields of the major crops in India and the means of improving both their quality and quantity. B. B. Mundkur (pp. 169–171), R. K. Saksena (pp. 179–182), and R. S. Vasudeva (pp. 191–193) all emphasize the immediate need and importance of establishing seed testing stations in all parts of India for maintaining pure and disease-free seed material, which would be of immeasurable value to both the farmers and the consumers. Certain lines are suggested on which these stations should be run to suit the conditions, crops, and diseases of India.

A list of certain seed-borne viruses and organisms found in some field crops and vegetables is given in Appendix I (p. 178).

Waggoner (P. E.) & Dimond (A. E.). **Crown gall suppression by anti-auxin.**—*Science*, 117, 3027, p. 13, 1953.

To test the theory that ionizing radiation, in suppressing galls caused by *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 32, p. 178], is acting by depressing the auxin level in the plants the authors exposed carrot roots inoculated with this organism to maleic hydrazide (MH) [ibid., 31, p. 529], which increases enzymatic destruction of indoleacetic acid (IAA). Slices of root were placed apical end down on 2 per cent. water agar, inoculated all at the same time with an aqueous suspension of *B. tumefaciens* (Riker's strain A-6), and then transferred at intervals to another plate, where the agar contained a $2{\cdot}67 \times 10^{-3}$ *M* concentration of the diethanolamine salt of MH. After incubation at room temperature for 12 days, the galls were graded according to size. The results showed that crown gall development was suppressed by MH applied as late as 168 hours after inoculation.

Similar results were obtained with greenhouse plants. When tomato roots were dipped in $5{\cdot}24 \times 10^{-3}$ M solution of the MH salt eight days after or at the time of

inoculation only small galls developed, though large ones grew on untreated plants. It is apparent that MH suppresses gall formation by affecting tumour enlargement, and not by affecting the alteration of normal cells to tumou ones or suppressing pathogen multiplication.

Braun (A. C.). **Conditioning of the host cell as a factor in the transformation process in crown gall.**—*Growth*, 16, 2, pp. 65–74, 2 figs., 1952.

In further studies at the Rockefeller Institute for Medical Research, New York, on the transformation of normal cells to crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 31, p. 423 and preceding abstract], using *Kalanchoe daigremontiana* as the test plant, conditioning of the cells, resulting from the stimulus of a wound, was shown to be essential for tumour formation. Conditioning proceeds independently of the bacteria at temperatures of 25° and 32° C., though cellular transformation is accomplished only at the lower temperature. The conditioning process is gradual, reaching a climax between the second and third days after wounding and declining as the wound heals. If the host cells are not properly conditioned, as apparently in both the early and late stages of wound healing, as well as in normal intact cells, cellular transformation will not occur despite the presence in the tissues of many virulent crown gall bacteria.

Cipriani (P. L.). **Affinità e disformità tra neoproduzioni vegetali da Agrobacterium tumefaciens (Smith et Townsend) Conn e tumori umani rilevati attraverso indagini cito-chimiche.** [Affinity and dissimilarity between the plant neoplasms of *Agrobacterium tumefaciens* (Smith & Townsend) Conn and human tumours demonstrated by cytochemical studies.]—*Phytopath. Z.*, 19, 1, pp. 1–19, 4 figs., 1952. [German, English, and French summaries.]

From a detailed study of the galls produced on *Ricinus communis* by *Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 30, p. 100] at the Institute of Plant Pathology, Pisa, no close analogies could be demonstrated between their properties and those reported for human tumours [ibid., 31, p. 105]. The plant galls arise through a reaction of the host cell to the bacterial stimulus, which is somewhat akin cytochemically to benign human tumours.

Patel (M. K.), Dhande (G. W.), & Kulkarni (Y. S.). **Studies in some species of Xanthomonas.**—*Indian Phytopath.*, 4, 2, pp. 123–140, 1951. [Received 1952.]

The eight species of *Xanthomonas* known in India [*R.A.M.*, 32, p. 12] were studied from morphological, cultural, and serological standpoints [at the College of Agriculture, Poona]. The bacteria were hardly distinguishable in morphology and cultural behaviour but on the basis of agglutination tests fell into five groups as follows: (*a*) *X. desmodii* [ibid., 30, p. 232], *X. cassiae* [ibid., 31, p. 86], and *X. alfalfae* [ibid., 29, p. 406]; (*b*) *X. campestris* [ibid., 29, p. 548]; (*c*) *X. vignicola* [ibid., 29, p. 406] and *X. vesicatoria* [loc. cit.]; (*d*) *X. desmodii-gangetici* [ibid., 29, p. 145], and (*e*) *X. malvacearum* [ibid., 28, p. 572]. A key for identifying the species is presented. *X. alfalfae* is distinguished by its inability to liquefy Loeffler's blood serum and *X. vignicola* by its ability to utilize acid; *X. cassiae* is inhibited by crystal violet 1 in 50,000, *X. malvacearum* by 1 in 16,666, and *X. vesicatoria* by 1 in 1,250. *X. badrii* [ibid., 29, p. 405] was not included in the serological test or the key.

Patel (M. K.), Bhatt (V. V.), & Kulkarni (Y. S.). **Three new bacterial diseases of plants from Bombay.**—*Indian Phytopath.*, 4, 2, pp. 144–151, 2 pl., 1951. [Received 1952.]

This is a more detailed account than that already noticed of studies in the Plant Pathological Laboratory, College of Agriculture, Poona, Bombay, on the symptoms,

host range, reactions, and taxonomy of *Xanthomonas lawsoniae*, *X. tamarindi*, and *X. poinsettiicola* on *Lawsonia alba* [*L. inermis*], *Tamarindus indica*, and *Euphorbia pulcherrima*, respectively [*R.A.M.*, 31, p. 479]. The three pathogens appear to be restricted to their original hosts. The optimum growth temperature was the same for all three, viz., 27° to 31° C., and the thermal death point about 51°. *X. tamarindi* was unable to reduce nitrates to nitrites.

Boosalis (M. G.). **The epidemiology of Xanthomonas translucens (J. J. and R.) Dowson on cereals and grasses.**—*Phytopathology*, 42, 7, pp. 387–395, 1952.

By means of the partial-vacuum inoculation technique already described [*R.A.M.*, 29, p. 356] isolates of *Xanthomonas translucens* from cereals and grasses were identified on the basis of pathogenicity as belonging to the varieties *undulosa*, *hordei-avenae*, and *cerealis*, of which the first-named attacked wheat, *Bromus* [*Zerna*] *inermis*, oats, *Agropyron repens*, and rye, the second oats and barley, and the third all the species tested. A new symptom of the streak disease was observed on Timstein wheat and some of its derivatives, consisting in a glistening, translucent, diffuse watersoaking of the glumes without appreciable light or dark brown to black discoloration.

In Minnesota, where these studies were carried out, the pathogens may overwinter on barley and wheat seed and barley and *Z. inermis* straw, or on winter plants of wheat, rye, *A. repens*, and *Z. inermis*. Moreover, all this material, except wheat seed, may provide the initial inoculum for spring infection. *X. translucens* does not long survive in non-sterile soil unless it is in or on plant parts. Transmission of the bacteria on straw or by aphids, wind, rain, or contact between diseased and healthy plants was effected only when the host tissue was water-congested. Experiments have further disclosed the existence of a biotic relationship between *X. translucens* and the root-rotting and leaf-spotting fungi, *Helminthosporium sativum* and *H.* sp., which appears strongly to influence the epidemiology of the bacterium. It is suggested that the fungal hyphae carry the bacteria to the emerging seedlings of their hosts.

Elomaa (Antti). **Viljan peittauskokeiden tuloksia vuosilta 1928–1950.** [Results of cereal seed disinfection experiments from 1928 to 1950.]—*Valt. Maatalousk. Tiedon.* 226, 43 pp., 1952. [English summary.]

The results are presented and tabulated of cereal seed disinfection tests carried out between 1928 and 1950 on farms in different parts of Finland, as well as at various research centres. Of 228 experiments covering the period from 1929 to 1948, 86 per cent. of those on winter rye (80 experiments) resulted in yield increases attributable to the prevention of snow mould (*Fusarium nivale*) [*Calonectria nivalis*: *R.A.M.*, 31, p. 550]. The corresponding percentages for 11 tests on winter wheat, 69 on barley, 42 on oats, and 76 on spring wheat were 100, 84, 98, and 79. The increase in the spring wheat yield is ascribed to the prevention of bunt (*Tilletia tritici*) [*T. caries*] and moulding of seed by *Fusarium* spp. The heavier yields of treated barley reflected the control of *Helminthosporium gramineum*, *F.* spp., and covered smut (*Ustilago hordei*), and those of oats the elimination of *F.* spp. and loose smut (*U. avenae*).

Atkinson (R. E.). **Studies on viruses of cereal grains.**—*Diss. Abstr.*, 12, 4, p. 375, 1952. [Mimeoprinted.]

In studies at the University of Missouri, western wheat mosaic virus [? strain of wheat mosaic virus: *R.A.M.*, 32, p. 122] was easily transmitted by carborundum-rubbing. It was also transmitted to 43·7 per cent. of 273 plants by the greenbug (*Toxoptera graminum*) [ibid., 28, p. 281] and to 38·2 per cent. of 322 plants by

Rhopalosiphum prunifolii [*R. insertum*: cf. ibid., 31, p. 597]. Hosts included wheat, oats, barley, maize, and proso millet [*Panicum miliaceum*]. *Triticum durum*, *T. turgidum*, and *T. dicoccum* [ibid., 31, p. 235] were very susceptible. The severity of this virus may be reduced by delaying autumn planting until conditions are no longer favourable for the development of the vectors.

Smeltzer (D. G.). **Inheritance of resistance to race T-1 of Tilletia caries in Minturki and Cooperatorka Wheats.**—*Agron. J.*, 44, 10, pp. 529–533, 1 graph, 1952.

Evidence was secured in 1949 at the Division of Agronomy, University of California, Davis, that the resistance of Minturki wheat to race T-1 of *Tilletia caries* [*R.A.M.*, 30, p. 221] is controlled by two weak genes, *UU*, *VV*. *UU* permitted the development of about 42·5 per cent. infection in the homozygous and 55 per cent. in the heterozygous state, while the corresponding figures for *VV* were 35 and 50. The winter of 1948–9 was exceptionally severe, and unpublished data obtained from a cross of White Federation × Minturki in 1929, a more normal season, suggest the operation in such years of one or more genes besides the two foregoing. Weak genes, *XX*, *YY*, and *WW* have been reported by El Khishen and Briggs [loc. cit.] (*J. agric. Res.*, 71, pp. 403–413, 1945) and E. P. Baker (unpublished thesis, University of California, 1949), but no crosses were available for a study of the relationship between them and the Minturki factors. Minturki, a derivative of a cross between Turkey [*R.A.M.*, 32, p. 15] and Odessa must have received its genes for resistance to race T-1 from Turkey, since Odessa carries only the Martin gene [ibid., 12, p. 85; 31, p. 59], not present in Minturki, but its resistance appears to be of an unstable nature, since it broke down under the adverse conditions of 1949.

Resistance to race T-1 in Cooperatorka was found to depend on the Martin gene, *MM*. Linkage intensities between *MM* and *TT* and between *MM* and *RR* fell within the limits of those previously reported [ibid., 19, p. 648; 20, p. 457].

From a consideration of the available information it is concluded that any of the known major genes could be used for the incorporation of bunt resistance into susceptible commercial wheat varieties. In a practical breeding programme, such as Harlan and Pope's back-cross procedure (*J. Hered.*, 13, pp. 319–322, 1922), establishment of the *MXRT* linkage group in a homozygous dominant condition in a well-adapted variety would provide a valuable source of resistance factors. Weak genes with reinforcing effects, such as those carried by Minturki, might find a place in breeding for resistance to particular races of *T. caries*.

Warmbrunn (K.). **Untersuchungen über den Zwergsteinbrand.** [Studies on dwarf bunt.]—*Phytopath. Z.*, 19, 4, pp. 441–482, 6 figs., 2 graphs, 2 maps, 1952.

The author's comprehensive studies at the Hohenheim Plant Protection Institute, Württemberg, Germany, on the morphology, physiology, and relation to environmental factors of dwarf bunt of wheat, which he considers to be more than a mere race of *Tilletia tritici* [*T. caries*], ranking at least as a subform or, more likely, a different species [*T. brevifaciens*: cf. *R.A.M.*, 31, p. 547], are fully described in connexion with 50 contributions to the literature.

The chlamydospores of the collections examined differed from those of *T. caries* only in the reticulations, the ridges of which were about twice as high in dwarf bunt. A small proportion of spores (4·1 and 7·9 per cent. in 1948 and 1949, respectively), was of a hyaline variant, sometimes only half the usual size. Both coloured and hyaline types were enveloped by a gelatinous, transparent layer [cf. ibid., 31, p. 378]. The average dimensions of the dwarf bunt balls were 3·3 by 3·2 mm., compared with 4·8 by 3·6 for the ordinary form, and their weight (per 100) 1·05 gm. as against 1·95 gm. The height of haulms infected by dwarf bunt ranged from 9 to 74 cm. with an average of 31·6 cm. in comparison with 92·15 cm.

for those of healthy plants. Exceptionally luxuriant tillering was a feature of dwarf bunt plants, numbering up to 15 haulms, while the average for healthy ones was 6·7 [cf. loc. cit.]. Dwarf bunt was observed on rye in 1948.

None of the laboratory methods tested for chlamydospore germination proved successful. Seed inoculation failed to produce diseased plants, which did, however, develop in several experiments with artificially infested soil [cf. ibid., 32, p. 15]. Dwarf bunt spores appear to require a longer resting period in the soil and to retain their viability longer than bunt spores. In both years the disease was most virulent at the highest altitudes (down to about 540 m.) on a northern mountain slope in the Münsingen area, where such factors as heavy precipitation, low temperature, slow plant growth, and acid soil reaction favoured the development of the fungus. The incidence of infection was generally highest within 1 to 2 m. from the edge of the field, where the sparsely sown plants receive plenty of light and nutriment to encourage copious growth of the highly susceptible secondary tillers, and decreased gradually towards the centre.

During the two years of the survey complete immunity was shown only by the American varieties Ridit and Hussar and Hohenheim selection 29. Least susceptible among the German varieties were Taca and Wahrberger Ruf, but their degree of resistance is insufficient. Spelt was severely attacked, the least susceptible varieties being the indigenous Steiners Red Tirol, Rechbergs Brown, and Rechbergs Early. Legumes were the most unfavourable crop as precursors of wheat in the rotation. For instance, in one area the percentages of infection following potatoes and field beans were 5 to 6 and 11, respectively, while in another locality the corresponding levels for beet and clover were a trace and 6 to 8 per cent. In 1948–9 calcium cyanamide [ibid., 31, p. 278] at 70 and 80 kg. per ha. gave good control of the disease, but in 1950–1 it failed to do so. A considerable increase of infection followed the use of stable or sheep or liquid manure. In both years late sowing (18th October) reduced bunt development as compared with early (24th September) and intermediate (4th October). For seed disinfection brassicol should be applied at the rate of 0·5 kg. per are [119·6 sq. yds.] for wheat and 1 to 1·5 kg. for spelt. An appreciable reduction of bunt may be effected by rational cultural methods, including (besides those already indicated) the extended use of the non-susceptible summer wheat. Dwarf bunt is suppressed by the ordinary form and is therefore more prevalent in stands given fungicidal treatments to eliminate the latter than in untreated.

Pichler (F.). **Über die Anfälligkeit der österreichischen Weizensorten für Weizensteinbrand (Tilletia tritici).** [On the susceptibility of Austrian Wheat varieties to Wheat bunt (*Tilletia tritici*).]—*Bodenkultur*, 5, 1, pp. 61–66, 1951.

In experimental seed treatments for the control of wheat bunt (*Tilletia tritici*) [*T. caries*] in Austria [*R.A.M.*, 30, p. 516 and next abstract] in 1950, the incidence of infection in the moderately resistant Austro-Bankut variety was reduced from 7·1 per cent. to nil by agronal, agrosan, epro, gervit, and hagesan, but none of these was fully effective on the susceptible Ritzlhofer with an infestation of 49·7 per cent., the percentage infection following treatment with the five fungicides being 0·2, 0·3, 1·5, 0·4, and 0·8, respectively. This is a matter of considerable importance in relation to seed certification, and emphasizes the fact that seed treatment is much more reliable on resistant than on susceptible varieties.

It is clear from a study of the results of inoculation experiments covering the periods 1942–44 and 1947–50 that there can be great disparities in reaction to bunt, not only between individual varieties of winter wheat but also in the same variety in different years. Thus, the average incidence of infection in Austro-Bankut for the five years was 17·4 per cent., compared with 76·9 in Probstdorfer Kolben, 69 in Ritzlhofer, and 64·1 in Tassilo (all three-year averages), the three most susceptible

of the 17 varieties tested. In the years 1942–3, 1943–4, 1947–8, 1948–9, and 1949–50 the percentages of bunt in Austro-Bankut were 13·1, 17·3, 35·5, 1·7, and 19·2, respectively, while in Manitoba × Probstdorfer the corresponding figures for the three latest seasons were 48·7, 29·5, and 7·5 (average 28·6). Other fairly resistant varieties were Loosdorfer Bart, Kadolzer, and Immendorfer Kolben, with three-year averages of 22·9, 23·1, and 26·4 per cent. bunt, respectively. Comparing the most recent figures with those of 1932 to 1936 and 1936 to 1942 (reported in *Landeskultur*, 4, p. 105, 1937; *Wien. landw. Ztg*, 39, p. 87, 1943), the most striking discrepancy is the absence in the two earlier periods of bunt percentages exceeding 60, although inoculum from the highly susceptible Manker variety in all the experiments was applied at the same strength (0·5 per cent.). Evidently, therefore, the incidence of bunt on Austrian winter wheats has been generally increasing during the past 20 years.

In a comparative trial of six summer wheat varieties inoculated seed was sown on 14th October, 1949, and 22nd March, 1950. The percentages of infection in the winter-sown crops of Eglfinger Hohenstaufen, Janetzkis early, Janetzkis Jabo, early Tyrolese Binkel, Wieselburger Kolben, and Znaimer × Tucson were 30·4, 29·2, 17·7, 18·5, 27·2, and 30·1, respectively, the corresponding figures for the spring-sown being 7·4, 0·9, 1·5, 2·3, 0·2, and 0, respectively, demonstrating the strong resistance of this group at their normal period of cultivation and their comparative susceptibility when treated as a winter crop [cf. *R.A.M.*, 11, p. 705].

Lasser (E.). **Die Züchtung schwarzrostresistenter Weizensorten für den Alpenraum.** [The breeding of black rust resistant Wheat varieties for the Alpine zone.]—*Bodenkultur*, 5, 1, pp. 67–75, 1951.

Of 15 winter wheat varieties tested in 1939 and 1940 for their reactions to black rust (*Puccinia graminis*) at Drauhofen, Carinthia, Austria [*R.A.M.*, 24, p. 308], under conditions of heavy natural infection only Plantahofer showed a measure of resistance. It was also resistant to yellow rust [*P. glumarum*] and in the latter year to brown rust [*P. triticina*].

From some lines resistant to *P. graminis* among the progeny of three crosses between Thatcher and Kronen and one of Thatcher × Heine IV, supplied by the Halle Plant Breeding Station in 1940, four winter wheat varieties, resistant to black rust, were developed from 1941 to 1947, namely, Dr Lassers Dickkopf, Reichersberger St.39, Admonter early, and Reichersberger St.42. They have been distributed to the appropriate Austrian centres for eventual release to growers. Of the 30 summer wheats exposed to black rust from 1948 to 1950, inclusive, 14 American varieties were resistant, but they are unsuitable for local cultivation on account of their spreading growth habit; in 1950, moreover, all except Carleton and Hope were severely attacked by mildew [*Erysiphe graminis*: loc. cit.]. Some of these varieties, however, are being used as progenitors. Three Austrian and five German varieties were fairly resistant to mildew but susceptible to black rust, while eight of the author's hybrids proved resistant or highly resistant to both diseases.

The physiologic races of *P. graminis* present in Carinthia (and presumably throughout the Alpine zone) were determined by four years' experiments with the 12 test varieties of Stakman *et al.* [ibid., 24, p. 272] as 21 and the nearly related 90, 94, and 161.

Among other desirable characters to be developed in new wheat varieties for local cultivation is resistance to loose smut [*Ustilago tritici*] and bunt [*Tilletia caries*: see preceding abstract]. Dr. Lassers Dickkopf, Reichersberger St.39, Admonter early, and Reichersberger St.42 are all susceptible to bunt and resistant to brown and yellow rusts, while Dr Lassers Dickkopf and Admonter early are resistant to loose smut and the two Reichersbergers fairly resistant.

Hassebrauk (K.). **Untersuchungen über die Einwirkung von Sulfonamiden und Sulfonen auf Getreideroste. II. Weitere Untersuchungen über die rosthemmende Wirkung. III. Untersuchungen über den Wirkungsmechanismus von Sulfonamiden und Sulfonen.** [Studies on the action of sulphonamides and sulphones on cereal rusts. II. Further studies on the rust-inhibiting effect. III. Studies on the mechanism of the action of sulphonamides and sulphones.] —*Phytopath. Z.*, 18, 4, pp. 453–460; 19, 1, pp. 56–78, 1 fig., 1952.

Continuing his studies at the Brunswick branch of the Biological Institute on the action of sulphonamides and sulphones on cereal rusts [*R.A.M.*, 31, p. 176], the author found that fructification of *Puccinia graminis* and *P. glumarum* was completely inhibited, irrespective of temperature, when potted wheat seedlings (using the Rüfenach 6 variety in pasture soil for the former and Michigan Amber in sandy loam for the latter rust) were supplied on the day of inoculation with ladogal [loc. cit.] at the rate of 1,500 and 1,700 mg., respectively, per 100 sq. cm. soil surface. In small-scale tests the same compound at a dosage of 1,800 mg. per 100 sq. cm. also entirely suppressed infection of snapdragon [*Antirrhinum majus*] seedlings by *P. antirrhini* [cf. ibid., 32, p. 201].

There was no diminution in the rust-inhibiting influence of ladogal on wheat seedlings during a minimum period of four weeks in the greenhouse. Stunting of growth was observed in plants left for several weeks in soil treated with the chemical. With an increase in the humus constituents of the soil the rust-preventive effect of ladogal became progressively weaker, and in rotted peat it was practically nil, though sterilization of the soil partially restored toxicity.

In spraying experiments with ladogal solutions a minimum concentration of 3 per cent. was necessary for the total inhibition of *P. triticina*, and the disproportionately large quantities required by this mode of treatment would therefore be extravagant for potted plants. No conclusions as to rust control could be drawn from a field trial with ladogal owing to the low incidence of infection, but there were no phytotoxic effects on winter wheat as a result of treatment with dosages up to 300 gm. per sq. m.

It was shown by experiments with *P. triticina* on Michigan Amber wheat, *P. simplex* [*P. hordei*] on Fong Tien barley, and *P. coronata* on Flämings Goldhafer oats that the inhibitory effect of ladogal could be completely counteracted by equivalent dosages of *p*-aminobenzoic acid (PAB) [vitamin H']. Since sporulation of *P. triticina* on plants treated with ladogal could still be induced at least eight days later by the application of PAB it is clear that (*a*) infection becomes established in plants treated with sulphonamides and (*b*) they exert a fungistatic but not a fungicidal action on the rust. The inhibition of *P. triticina* by baludon [loc. cit.] was also counteracted in most of the tests by PAB.

Of the esters of PAB, larocaine had no influence, novocaine exercised a weak, and anaesthesine and propaesine a stronger, though somewhat irregular, preventive action on the development of *P. triticina*. Pontocaine operated like a sulphonamide, totally suppressing rust development when applied at 1·25 or 1·5 gm. per 100 sq. cm. on the day of inoculation or 24 hours beforehand, and displayed clear-cut antagonism to PAB. No inhibition of *P. triticina* was effected by *p*-aminosalicylic acid. PAB at 0·1 per cent. induced modifications in the type of brown rust infection only on highly resistant wheat varieties, such as Red Tirol or Rottweiler spelt, Hildebrandts White Victoria, or Sicilian spelt, in which chloroses and necroses developed prematurely in an intensified form. It failed to neutralize the inhibiting effect of picric acid [ibid., 16, p. 236] on brown rust.

The following are the principal conclusions drawn from this series of experiments. The suppression of the cereal rusts by sulphonamides is achieved, as in other organisms (the published results of which are tabulated), by means of a displacement of PAB in the host, the effect being in all probability directly on the pathogens

and not merely through a non-specific weakening of the plant due to the withdrawal of an essential vitamin. It is inadmissible, however, to establish on the basis of these conclusions a correlation between lack of pathogenicity and disparities in either the PAB content of the host or the vitamin requirements of the parasites. Moreover, even assuming that the rusts are heterotrophic for PAB, their need of it is not an acceptable explanation of the phenomenon of obligate parasitism.

Sortrustens bekæmpelse. Udryd de farlige Berberis-buske. [Black rust control. Eradicate the dangerous Barberry bushes.]—*Tidsskr. Planteavl*, 56, 1, pp. 141–144, 2 pl., 1952.

As a result of the epiphytotic of black rust (*Puccinia graminis*) on wheat in Denmark during the summer of 1951 [*R.A.M.*, 31, p. 233] a notification of the Ministry of Agriculture dated 19th October, 1951, was issued prescribing the eradication [cf. ibid., 31, p. 599] of *Berberis canadensis*, *B. chinensis*, *B. wilsonae*, and *B. ilicifolia* in addition to the common barberry (*B. vulgaris*) and especially its var. *atropurpurea* [ibid., 17, p. 603].

[This paper also appears as *Medd. Forsøgsv. Plantekult. Kbh.* 472, 1951.]

Martinez M. (L.). **Inheritance of reaction to leaf rust, Puccinia rubigo-vera tritici (Eriks.) Carleton, and of certain other characters in a Wheat cross.**—*Diss. Abstr.*, 12, 4, pp. 371–372, 1952. [Mimeoprinted.]

Studies were made in 1950 at the University of Minnesota to determine the mode of inheritance of reaction to wheat leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 31, p. 10] in the cross Thatcher × (Premier × Bobin-Gaza-Bobin) N.S. No. II–39–2. The latter parent is highly resistant to several leaf rust races in the seedling stage and moderately field resistant to several when mature. The inheritance of mature plant field reaction to a collection of leaf rust races is attributed to the action of three independent genetic factor pairs, any dominant one causing susceptibility. Seedling reaction to races 1, 2, 5, 15, 28, and 128*a* is determined by six different, probably linked genes, one for each race, susceptibility being dominant. The reaction to races 3, 58, and 126, and to 18 bulked races is determined by two genetic factors. Ratios for reaction to races 3 and 58 were of the 15:1 type while that to race 126 was probably of the 13:3 type with susceptibility dominant in both cases [see next abstract].

Association studies of seedling reactions to individual leaf rust races revealed that at least 8 and probably 12 genetic factors control seedling reaction to races 1, 2, 3, 5, 15, 28, 58, 126, and 128*a* in the material studied. There was an association between the seedling and six-leaf stage reactions of F_4 plants to the collection of 18 races. However, only 63 per cent. of the 304 F_4 plants gave the same reaction in both stages; of these 32 per cent. were more resistant in the six-leaf stage while 5 per cent. were more resistant as seedlings.

One major genetic factor appeared to control the mature plant reaction to a number of stem rust [*P. graminis*: ibid., 32, p. 180] races in the field. The susceptibility of II–39–2 was dominant over the moderate resistance of Thatcher [cf. ibid., 31, p. 482, and above, p. 242].

Heyne (E. G.). **Inheritance of leaf rust, Puccinia rubigo-vera tritici (Erikss. and Henn.) Carl., reaction and other characters in crosses among three Wheat varieties.**—*Diss. Abstr.*, 12, 5, pp. 560–561, 1952. [Mimeoprinted.]

At the University of Minnesota a study was made of the mode of inheritance of reaction to leaf rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: see preceding abstract] in crosses between the winter wheat varieties Pawnee and RedChief and the spring wheat Timstein.

Timstein resisted races 5, 9, 15, 44, and 126 in the seedling stage; Pawnee was resistant to race 9 only of these, and RedChief susceptible to all. In the adult stage Timstein resisted these races and others that occurred naturally in the field in Kansas in 1949 and 1950 [*R.A.M.*, 31, p. 10]. Pawnee and RedChief were susceptible to the collections of races used in the field. Timstein was also resistant in the adult stage to races 17, 38, 56 of stem rust [*P. graminis*: ibid., 31, p. 277], introduced artificially in the field, and to races occurring naturally in 1949. Pawnee and RedChief were susceptible in the adult stage to the stem rust races present in the field in 1949.

The adult reaction of F_3 and F_4 lines of Pawnee × Timstein indicated one major recessive factor controlling leaf rust reaction, and suggested the presence of one or more modifying factors. The reaction of RedChief × Timstein progeny was controlled by one major recessive factor and a minor modifying or additive one. All F_2 plants of Pawnee × RedChief were susceptible to leaf rust in the adult stage. The reaction of greenhouse seedlings from RedChief × Timstein to races 5, 9, 15, 44, and 126 indicated that the resistance of Timstein was governed by one major recessive factor and at least one modifying factor, which appeared to be associated so that about one-half of the lines highly resistant in the adult stage to a collection of races were also highly resistant to the five races in the seedling stage.

The Pawnee × Timstein crosses indicated that the former contributed at least one major, partially dominant factor giving resistance to race 9, and the latter a nearly recessive factor. Additional modifying genes present were probably contributed by each parent. The response of F_3 lines to races 5, 15, 44, and 126 was similar to their reaction to 9, indicating that the same factors governed resistance to all these races.

The adult stage reaction to stem rust [see preceding abstract] of the F_3 generations suggests a major dominant resistant factor from Timstein. All F_2 plants from Pawnee × RedChief were field susceptible to stem rust. Pawnee's factor for resisance to race 9 of leaf rust was linked to Timstein's adult reaction to stem rust in the field.

Bockmann (H.). **Der Einfluss der Stickstoffdüngung auf die Halmbruchkrankheit (Lagerfusskrankheit) des Weizens.** [The influence of nitrogenous manuring on the straw-breaking disease (lodging foot rot) of Wheat.]—*Phytopath. Z.*, 19, 3, pp. 383–388, 1952.

The results of field experiments covering the period from 1949 to 1951 at the Kiel-Kitzeberg (Schleswig-Holstein) branch of the Biological Institute showed that the influence of a supplementary nitrogen fertilizer (lime ammonium nitrate at 2 doppelzentner [200 kg.] per ha. in spring) on the incidence of wheat infection by *Cercosporella herpotrichoides* [*R.A.M.*, 31, p. 548] depends largely on the density of the stand and consequent scope for tillering. If the stand is sufficiently sparse to permit the full development of several ears per plant, the treatment mitigates the adverse effects of the disease, but if planting is unduly close additional applications of nitrogen tend to promote rather than arrest the activity of the fungus.

Müller (E.). **Pilzliche Erreger der Getreideblattdürre.** [Fungal agents of cereal leaf desiccation.]—*Phytopath. Z.*, 19, 4, pp. 403–416, 6 figs., 1952. [English summary.]

The author's taxonomic studies at the Agricultural Research Institute, Zürich-Oerlikon, on some fungi causing leaf blotch of cereals in Switzerland [cf. *R.A.M.*, 32, p. 181] in 1951 led to the establishment of three new species and a new combination.

Didymella caudata n.sp., isolated from dead wheat leaves and stems in October, 1951, is characterized by subepidermal, erumpent, globose perithecia (which also

developed on malt agar), 80 to 200 μ in diameter, with a conical or cylindrical ostiole with short, brown setae at the tip and perforated by a pore with prominent, horizontal, broad, hyaline hyphae; the paraphyses are filiform, the asci 55 to 70 by 10 to 12 μ, and the uniseptate ascospores, 10·5 to 13 by 4 to 4·5 μ, provided at both ends with hyaline, mucous, cylindrical appendages, 3 to 4 μ long. The fungus caused little damage in inoculation experiments, in which [wheat] plants were grown in test tubes containing Knop's solution with their roots in darkness.

Synonyms of *D. exitialis* (Mor.) n.comb. are *Sphaerella exitialis*, *D. autumnalis*, *Ascochyta sorghi*, *A. graminicola* [ibid., 31, p. 533] and its vars. *leptospora*, *holci*, and *diedickeana*, and *A. elymi*. Both pycnidia and perithecia developed from single conidial and single ascospore cultures on filter paper steeped in nutrient solution.

One of the principal agents of leaf blotch is *Leptosphaeria nodorum* n.sp., the perfect state of *Septoria nodorum* [loc. cit.], isolated from a heavily infected wheat crop [cf. ibid., 2, p. 212]. The subepidermal, subglobose or depressed, brown-walled perithecia, 160 to 250 μ in diameter, are furnished with a conical ostiole; the asci, 60 to 70 by 9 μ, are surrounded by numerous filiform paraphyses and contain triseptate, subhyaline to faint yellow ascospores, tapering at both ends and measuring 20 to 26 by 4 μ.

The pycnidia of *Phoma triticina* n.sp., a moderately severe parasite of spelt wheat, measure 50 to 80 μ in diameter; the simple, papilliform, hyaline conidiophores are 2 to 3 μ in length, and the conidia 5·5 to 6·5 by 3 to 3·5 μ.

Two collections of *Calonectria graminicola* [*C. nivalis*] from wheat yielded predominantly uniseptate ascospores, 12·5 to 17 by 3 to 4 μ. Some observations are also made on *L. tritici* and *S. tritici* [ibid., 31, p. 533]; the attribution of the former to *L. eustomoides* [ibid., 31, p. 58] is now rejected.

Tomiyama (K.). **Several factors affecting the Typhula snow blight of winter Wheat.** —*Ann. phytopath. Soc. Japan*, 16, 3–4, pp. 113–116, 1952. [Japanese.]

The infection of older wheat leaves by *Typhula itoana* and *T. ishikariensis* in Japan [*R.A.M.*, 31, p. 177] usually occurs in the early stage of the snow cover, the latter passing from the older to the younger leaves, on which it grows freely. Wheat plants already attacked by *T. itoana* often escape severe infection by *T. ishikariensis* owing to antagonism between the two pathogens. Therefore the age of the leaves and the relative frequency of the two fungi are important factors in the degree of severity of snow blight.

Skoropad (W. P.) & Johnson (L. P. V.). **Inheritance of resistance to Ustilago nuda in Barley.**—*Canad. J. Bot.*, 30, 5, pp. 525–536, 1952.

The inheritance of resistance in barley to loose smut (*Ustilago nuda*) [*R.A.M.*, 31, p. 485], races Tr and Ts (a new race), was studied at the University of Alberta, Edmonton, in several crosses and back-crosses in which the varieties Jet and Titan were the resistant parents, the former being resistant to both races and the latter to Tr only. Their resistance to Tr was governed by a single dominant gene in each, *Un* in Titan and Un_3 in Jet [see next abstract]. The resistance of Jet to Ts was also due to a single, dominant gene, probably newly discovered, and provisionally designated Un_6. Resistance appears to lie in the genetic constitution of the developing embryo, the surrounding floral structures being susceptible.

Mohajir (A.-R.), Arny (D. C.), & Shands (H. L.). **Studies on the inheritance of loose smut resistance in spring Barleys.**—*Phytopathology*, 42, 7, pp. 367–373, 1952.

In further studies at the Departments of Agronomy and Plant Pathology, University of Wisconsin, Madison, on the inheritance of resistance to loose smut

(*Ustilago nuda*) in spring barleys [*R.A.M.*, 26, p. 101 and preceding abstract], the reactions of the F_1, F_2, and F_3 progeny of crosses between susceptible and resistant varieties and the F_1 behaviour of reciprocals of two crosses indicated that resistance was dominant over susceptibility.

The resistance to smut of Abyssinian and Jet [loc. cit.] was found to depend on two factor pairs in each variety when crossed with the susceptible variety X255–1 and the moderately susceptible Arthritis. The low incidence of infection in the F_2 lent weight to the hypothesis that more than one factor pair was involved. The indication of a gene in Jet additional to Un_3 [loc. cit.] may be explained by the use in these experiments of Arthritis instead of the very susceptible Colsess. The apparent transgressive segregation in a cross between the susceptible X191–24 and the highly resistant X237–3 may be the result of a recessive factor from the former parent. X237–3 is thought to have one factor pair for resistance.

Resistance in the crosses Arthritis × Jet and Arthritis × Abyssinian seemed to be governed by two factor pairs. The 11:4:1 ratio which was apparently operative in both crosses denoted that the two genes in Abyssinian and the two in Jet confer great resistance to loose smut in a high proportion of the progenies. Furthermore, the infection levels were generally low, suggesting that Arthritis provided a measure of resistance as compared with a fully susceptible variety.

Abyssinian appears to carry at least one gene differing from the Trebi one, *Un*, and is resistant to both common *U. nuda* and the Trebi race (unpublished data from R. G. Shands). Since Schaller [ibid., 29, p. 297] found no association between the Jet gene and any of the other marker characters he studied, the connexion between the two-rowed character and smut resistance of Abyssinian suggested by the present investigations points to a difference between the factors controlling resistance in Abyssinian and in Jet.

Christensen (C. M.). **Molds on stored Barley.**—*Seed World*, 71, 8, p. 35, 1952.

In an address to the Barley Improvement Conference the author reports on further studies on mould growth in stored cereal grains [*R.A.M.*, 31, p. 112; 32, p. 182]. Mould [unspecified] grew readily on stored barley seed with a moisture content above 13·5 per cent. anywhere in the bulk, though growth was very slow below 60° F. and much more rapid at 70° and 90°. Mould deterioration of grain stored in bulk, particularly near the above mentioned moisture content critical for storage, usually increased in the spring.

Hingorani (M. K.). **Selfing studies with race 7 of Puccinia graminis avenae Erikss. and Henn.**—*Indian Phytopath.*, 4, 2, pp. 141–143, 1951. [Received 1952.]

In studies at the University of Minnesota *Puccinia graminis avenae* race 7 [*R.A.M.*, 31, p. 486; 32, p. 16] was grown in pure culture on barberry plants and selfed by crossing the pycnia. Individual aecidia were picked off and used to inoculate Bond, Minrus, Richland, and Jostrain oats. Race 7 is relatively homozygous with respect to factors for pathogenicity. From the variable infection types produced on Richland, however, it appears that new combinations did occur on barberry which, although not transcending the infection types normally produced by race 7 on the differential oat varieties, strongly suggested that there are probably several biotypes within race 7 differing quantitatively in their virulence to Richland. Further tests may demonstrate even greater differences on other varieties.

Missouri O-205 Oats considered to replace Columbia variety.—*Seed World*, 71, 11, pp. 44–45, 1952.

The Missouri O-205 oat variety [*R.A.M.*, 32, p. 177] is reported to be best

adapted to areas in Missouri where Columbia was previously grown and will probably replace this variety there and also half of the Clinton-type oats in Illinois. In addition to its resistance previously reported [loc. cit.] it is resistant to races 2 and 7 of stem rust [*Puccinia graminis*: see preceding abstract] and smuts [*Ustilago avenae* and *U. kolleri*: ibid., 31, pp. 180, 549].

Summers (T. E.). **Downy mildew (Sclerospora macrospora) of Oats in the south.**—*Plant Dis. Reptr*, 36, 9, pp. 347–348, 1952. [Multilithed.]

Alabama, Tennessee, and Florida are added to the list of the States of U.S.A. where oat downy mildew (*Sclerospora macrospora*) [*R.A.M.*, 31, p. 379] is present, having been detected there in the spring of 1952. The results of a survey of the southern States for the disease are given.

Johnson (T.). **Cultural variability in Septoria avenae Frank.**—*Canad. J. Bot.*, 30, 3, pp. 318–330, 2 pl., 1 fig., 1 diag., 1952.

Wild-type colonies with creamy-white mycelium, a brown substrate, and few, if any, pycnidia were consistently produced by numerous Canadian collections of *Leptosphaeria avenaria* [*R.A.M.*, 30, p. 507; 31, p. 379, and next abstract] when first isolated in the conidial state from oats in the field. Subcultures on potato sucrose agar gave rise to many variants, some predominantly mycelial and others with scanty mycelium, numerous pycnidia, and a blue-green substrate pigment. Mycelial types tended to produce pycnidial variants and vice versa. In some cultures staling followed by renewed growth commonly occurred; in others, strains arose having predominantly small pycnidia with spermatium-like microspores, though still capable of producing macrospores. Cultures from microspores included dark-pigmented, albino (with dark or colourless pycnidia), and purely mycelial types.

Stanton (T. R.). **Septoria black stem of Oats abundant in most of the north central States.**—*Plant Dis. Reptr*, 36, 9, p. 349, 1952. [Multilithed.]

Black stem of oats (*Leptosphaeria avenaria*) [see preceding abstract] attained epidemic proportions in many of the important oat-growing areas of Iowa, North and South Dakota, Minnesota, and Wisconsin in 1952. In some yield-test nurseries the disease caused as much as 100 per cent. lodging in certain varieties. State Pride and Spooner appeared to be injured less than most of the newer varieties, including many Bond derivatives.

Johnson (T.) & Green (G. J.). **Overwintering of urediospores of Rye stem rust in Manitoba.**—*Phytopathology*, 42, 7, pp. 403–404, 1952.

In a search for teleutospores of *Puccinia graminis* on *Agropyron repens* at Winnipeg, Canada, on 1st May, 1951, many apparently living uredosori were observed on dead stems of the previous year. Uredospore germination ranged from 2 per cent. in exposed uredosori to 20 per cent. in those from stems partially or wholly covered by sheaths. In subsequent collections on 15th May and 19th June the germination percentages ranged from a trace to 17 and 0 to 12, respectively. On the basis of inoculation experiments on wheat, oats, rye, and *A. repens* the rust was identified as *P. g. secalis* [*R.A.M.*, 32, p. 121].

New uredosori first appeared on 22nd May, when two pustules were detected, each on a second leaf from the base of a plant. Their location and premature development (about a month before the usual time for infection by wind-blown spores) pointed to their origin from overwintered uredospores. No outward spread was noted until 30th June, when uredosori could easily be found within a 3-ft. radius, while by 5th July they were traced for about twice that distance.

The overwintering of *P. g. secalis* at other sites in the vicinity was indicated by the discovery on 30th June of a heavily rusted stem of *A. repens* about 60 yds. from the original centre. On 11th July three further foci of infection were found, and it would appear that this overwintering is a normal process of survival in the northern United States and adjacent parts of Canada under such favourable weather conditions as prevailed in 1950–1. The late spring and summer of 1950 promoted both the growth of grasses and rust development until far into September. When the cold weather set in, much of the rust was still in the uredo stage and the survival of uredospores was assisted by the plentiful snow cover in the area under observation.

The balance of available evidence is against the overwintering of wheat stem rust (*P. g. tritici*) in a similar manner to the foregoing in Canada and northern United States [ibid., 8, p. 364; 24, p. 309].

McKeen (W. E.). **Phialophora radicicola Cain, a Corn rootrot pathogen.**—*Canad. J. Bot.*, 30, 3, pp. 344–347, 3 pl., 1952.

Phialophora radicicola [see below, p. 280] appears to be widely distributed on maize in Ontario; the author suggests that because of its colour and parasite-host relations it may have been mistaken in the past for *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 31, p. 60] or *Rhizophagus* sp. [ibid., 26, p. 505]. The fungus could be isolated only from apparently healthy maize root tissue. Its ability to sporulate was lost after two to three months in agar culture but was revived by growing on moist maize roots. It can attack the roots at any time throughout the season, the brown runner hyphae growing parallel to the roots, which are penetrated by the finer infection hyphae. Penetration may be preceded by the formation by the host cell of 'wall tubules' on the inner side of the wall, through which the infection threads pass. *P. radicicola*, though not very pathogenic, is apparently followed by numerous secondary parasites and may, therefore, be an extremely important factor in the degeneration of maize roots.

Biraghi (A.). **Ulteriore contributo alla conoscenza del 'nanismo ruvido' del Mais.** [A further contribution to the knowledge of 'rough dwarfing' of Maize.]—*Ann. Sper. agr.*, N.S., 6, 4, pp. 1043–1053, 7 pl., 1 fig., 1952. [English summary.]

Since 1949 maize dwarf in Italy [*R.A.M.*, 31, p. 180] has appeared only in a few fields in Salerno in 1950 and in two fields in Pavia in 1951. When the disease occurs at an early stage of growth dwarfing affects the first internodes and reduction in plant height reaches a maximum. In very severe cases the plant remains sterile, the male inflorescence emerges with difficulty and the anthers often fail to open, while the female inflorescence may remain rudimentary or develop only to a certain extent, the formation of the styles being sparse and slow; in slight cases flowering is normal and the inflorescences reach maturity.

When dwarfing appears early, the leaves, especially those at the apex, are chlorotic, reddened, and often withered at the tips. A diagnostic feature is a roughness of the lower surface, caused by hyperplasia of the veins. The 'galls' are very numerous, affecting considerable lengths of almost all the leaf veins, and occur in smaller numbers on the veins of the bracts, on which they appear as white pustules. Thickening of the base of the stem [ibid., 29, p. 95] appears to be an optical illusion; Rui's figures [ibid., 30, p. 316] showed that the average diameter of the basal internode of affected plants is 2·1 and of healthy 2·2 cm. The root system of affected plants is greatly reduced, discoloured, and rotted at the extremity; the roots are fragile and many have deep longitudinal cracks.

The term 'epidemic dwarfing' is considered unsatisfactory, and the author suggests 'rough dwarfing'. The disease has close analogies with sugar-cane Fiji

[virus] disease and maize wallaby ear [virus: ibid., 25, p. 540]. Further investigations are in progress.

İREN (S.). **Mısır pası (Puccinia sorghi Schw.).** [Maize rust (*Puccinia sorghi* Schw.).] —*Bit. Kor. Bült., 1952*, 3, pp. 47–49, 2 figs., 1952. [English summary.]

Maize rust (*Puccinia sorghi*) was observed in Çankırı, in the central plateau of Turkey, in August, 1951, this being the first record for the country. Its alternate host, *Oxalis corniculata* [cf. *R.A.M.*, 29, p. 20; 30, p. 563], is abundant in some of the northern provinces constituting the main maize belt.

LOVISOLO (O.). **Osservazioni preliminari sui funghi parassiti Hadrotrichum phragmitis e H. sorghi.** [Preliminary observations on the parasitic fungi *Hadrotrichum phragmitis* and *H. sorghi*.]—*Nuovo G. bot. ital.*, N.S., 58, 3–4, pp. 619–621, 1951. [English summary. Received December, 1952.]

The author considers that the genus *Hadrotrichum* requires emendation before it can accommodate such species as *H. sorghi* and *H. virescens* [*R.A.M.*, 12, p. 550], the former occurring in Italy on sorghum, *Sorghum halepense*, *S. exiguum* [*S. virgatum*] and *S. vulgare* vars. *saccharatum* [*S. saccharatum*] and *technicum* [*S. bicolor* var. *technicum*]; *H. phragmitis* occurs on *Phragmites communis*.

Sugar Sorgo research at Houma, Louisiana.—*Sug. Bull., N. Orleans*, 30, 23, pp. 392, 399, 1952.

The 1951 sweet sorghum [*Sorghum saccharatum*] disease test at Houma, Louisiana, comprised 48 varieties grown on silt loam soil. The highly productive, recently released syrup variety, Sart, is extremely resistant to leaf anthracnose and red rot of the stalks [*Colletotrichum graminicola*: *R.A.M.*, 30, p. 463], but very susceptible to zonate leaf spot [*Gloeocercospora sorghi*: ibid., 30, p. 565] and rust [*Puccinia purpurea*], the two latter being largely responsible for a severe deterioration in juice quality. A few varieties, such as MN 1054, are resistant to the above-mentioned diseases and may prove valuable for breeding purposes, but their juice is of a low grade.

CICCARONE (A.). **Un 'marciume basale' dei frutti di Mandarino e di Arancio.** [A 'basal rot' of Mandarin and Orange fruits.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 123–125, 1 fig., 1951.

This paper on physiological fruit drop of citrus associated with secondary fungi has already been noticed from another source [*R.A.M.*, 29, p. 615].

GOIDÀNICH (G.) & RUGGIERI (G.). **Effetti del freddo e 'mal secco' negli Agrumeti siciliani.** [The effects of cold and 'mal secco' in Sicilian Citrus groves.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 43–49, 6 figs., 1951. [English summary.]

This paper on *Deuterophoma tracheiphila* in relation to low temperature infection of citrus has already been noticed from another source [*R.A.M.*, 28, p. 626].

LUCIE-SMITH (M. N.). **The cultivation of West Indian Limes.**—*J.* (formerly *Proc.*) *agric. Soc. Trin. Tob.*, 51, *Suppl.*, pp. 2–14, 3 figs., 1951.

In this interesting review of the lime industry in Trinidad and Tobago it is stated that Bordeaux mixture or perenox should be used for the control of scab [*Elsinoe fawcetti*: *R.A.M.*, 29, p. 291; 32, p. 184] on the lemon and sour orange stocks used for grafting lime in nurseries. Until the development of an immune variety for the control of withertip [*Gloeosporium limetticola*: ibid., 32, p. 65] limes should be restricted to drier areas. Copper and lime-sulphur sprays are impracticable in view

of the irregular flushing and blooming of limes. Epidemic die-back [loc. cit.] in Trinidad is very similar to, or probably identical with the red root lime disease in the Lesser Antilles [ibid., 24, p. 7]. The disease was observed in Dominica in 1927, Montserrat in 1933, St. Lucia in 1934, and Trinidad in 1938 and killed a large proportion of the lime population. The cause of the disease is still unknown, but it is not identical with a similar disease in West Africa [cf. ibid., 29, p. 97] due to tristeza virus. The former lacks the characteristic stem pitting and vein-clearing symptoms of a virus disease. Moreover, the extensive orange plantings on sour stocks, the combination most susceptible to tristeza, have not been affected by it in the West Indies. Despite the close proximity of Trinidad to Tobago and the lack of plant quarantine restrictions between them, Tobago and the north coast of Jamaica have remained free from the disease. This may be due to a soil factor, but the transport of any soil or lime plants from Trinidad to Tobago should be suspended until more is known of this disease and its cause.

Gummosis [*Phytophthora* spp.: ibid., 30, p. 411] and some other fungus diseases of minor importance are mentioned here. The witches' broom effect seen on some lime branches in Trinidad and Tobago is not caused by any pathogen.

Stout (G. L.) & McClain (R. L.). **Quick decline of Citrus.**—*Bull. Calif. Dep. Agric.*, 41, 2, pp. 58–60, 4 col. pl., 1952.

An account is given of the symptoms of citrus quick decline virus [*R.A.M.*, 31, p. 432] in California and methods of diagnosis [ibid., 29, p. 362; 30, p. 566].

Urhan (O.). **Llaga y marchitamiento del Cafeto causado por Myrothecium roridum Tode.** [Canker and wilt of Coffee caused by *Myrothecium roridum* Tode.]—*Bol. inf. Colombia*, 2, 16, pp. 33–45, 1951. [Abs. in *Hort. Abstr.*, 22, 1, pp. 129–130, 1952.]

Studies were made at the National Centre for Coffee Investigations, Chinchiná, Colombia, on a hitherto unknown disease of nursery coffee plants caused by *Myrothecium roridum* [cf. *R.A.M.*, 26, p. 474; 30, p. 139] and characterized by stem canker, wilt, and leaf spot. *Coffea robusta*, *C. liberica*, and *C. arabica* varieties Nacional, Bourbon, San Ramón, and Maragogype were equally susceptible.

The optimum temperature for development of the fungus was about 27° C., normal growth being inhibited above 30°. It tolerated a wide pH range, the growth rate being reduced only on very acid (pH 2·8) or very alkaline (pH 9·2) media. The formation of stem cankers was inhibited by a relative humidity below 64 per cent. Suggested measures for preventing the spread of the disease include the control of humidity in the nursery, destruction of infected plants, disinfection of the grafting knife, and the use of a new protective cover for each graft.

Holdeman (Q. L.) & Graham (T. W.). **The association of the sting nematode with some persistent Cotton wilt spots in northeastern South Carolina.**—Abs. in *Phytopathology*, 42, 5, pp. 283–284, 1952.

Although root examinations in eight fields of a cotton variety resistant to wilt (*Fusarium*) [*vasinfectum*] in South Carolina yielded no evidence of nematodes [cf. *R.A.M.*, 24, p. 99], washings from soil samples contained the free-living sting nematode, *Belonoliamus gracilis*. In a preliminary test in which resistant and susceptible varieties were sown in pots containing (*a*) infested soil and (*b*) soil freed from the nematode by air-drying, the percentages of wilt for the two varieties after about ten weeks were (*a*) 52 and 88, respectively, and (*b*) 0 and 10, respectively. A second collection of field soil gave comparable results. Although all the pots were occupied by other parasitic nematodes, the loss of resistance to wilt was correlated with high populations of *B. gracilis* [cf. next abstract].

Smith (A. L.) & Dick (J. B.). **The inheritance of resistance to Fusarium wilt in Upland and Sea Island Cotton.**—Abs. in *Phytopathology*, 42, 5, pp. 287–288, 1952.

Studies were carried out in naturally infested soils [in Alabama] on the inheritance of resistance to *Fusarium oxysporum* f. *vasinfectum* [*F. vasinfectum*], using the resistant Cook 307 and the susceptible Hurley's Rowden as parental upland cotton (*Gossypium hirsutum*) material. Resistance in *G. barbadense* was investigated in combinations of Seabrook (resistant) and Hurley's Rowden. Resistance to wilt in upland cotton is apparently governed by one dominant factor, but soil nematodes provide the primary channel of entry for the fungus [cf. preceding abstract], so that the severity of the disease and the reaction to infection are largely dependent on the response of the host to nematode attack. When the F_1, F_2, and F_3 generations were grown on soil partially freed from nematodes by fumigation, the resultant ratios indicated one dominant factor for wilt resistance. All the F_2 progeny of Seabrook × Rowden grown on untreated soil was resistant. On treated soil the F_2 segregation pointed to two dominant factors for resistance to *F. vasinfectum*, while the results obtained in the segregating generations of Cook × Rowden grown on untreated soil suggested multiple factors. It should be possible to develop a high degree of resistance to wilt by back-crossing to transfer the resistance in *G. barbadense* to upland cotton and selecting for a similar response to nematodes after each back-cross.

Abrahão (J.). **A manifestação tardia da 'ramulose' ou 'superbrotamento' do Algodeiro.** [The belated appearance of 'ramulosis' or 'superbudding' of Cotton.]—*Biológico*, 18, 8, pp. 135–138, 2 figs., 1952.

An unusual feature of 'ramulosis' of cotton (*Colletotrichum gossypii* var. *cephalosporioides*) in São Paulo, Brazil [*R.A.M.*, 28, p. 574], in the growing season of 1951–2 was its tardy development on the Express-I.A.7387 variety following heavy rains in March. Scattered through the plantations visited were well-marked patches of plants with symptoms on all the aerial organs, which had no doubt been produced from contaminated seed. Apart from these fields, in which the incidence of infection ranged from 25 to 30 per cent., the average was 15 per cent. Seed intended for planting should not be procured from infected fields.

Patel (M. K.) & Kulkarni (Y. S.). **Bacterial leaf spot of Cotton.**—*Indian Phytopath.*, 3, 1, pp. 51–63, 1 pl., 1950. [Received March, 1953.]

In amplification of a previous note [*R.A.M.*, 28, p. 15] an account is given of the distribution [C.M.I. map No. 57], economic importance, and symptoms of blackarm of cotton (*Xanthomonas malvacearum*) in India [ibid., 32, p. 238, and next abstracts]; isolation and inoculation experiments; morphology, cultural characters, biochemical reactions, and longevity of the causal organism; and transmission and host range. In inoculation experiments it failed to infect other Malvaceous hosts.

Ramakrishnan (T. S.) & Ramakrishnan (K.). **Observations on the blackarm of Cotton in Madras State.**—*Indian Phytopath.*, 3, 1, pp. 64–74, 1 pl., 1950. [Received March, 1953.]

Blackarm of cotton (*Xanthomonas malvacearum*) [see preceding and next abstracts] has been prevalent in Madras province on *Gossypium hirsutum* for several years, the intensity of infection being influenced by the amount of October to January rainfall. Seed treatment conferred protection for about a month but in the course of three months the secondary spread from neighbouring untreated plots became so widespread that the initial benefit was nullified. To be of any advantage, therefore, seed treatment should be carried out over the whole area.

G. arboreum and *G. herbaceum* varieties are mostly resistant or immune. In selection trials 458–1 was resistant in 1948–9 and 1949–50.

Kulkarni (Y. S.) & Patel (M. K.). **A preliminary note on the inheritance of blackarm resistance in some strains of Gossypium herbaceum L.**—*Indian Cott. Gr. Rev.*, 5, 3, pp. 148–152, 1951. [Received February, 1953.]

In India blackarm of cotton (*Xanthomonas malvacearum*) [*R.A.M.*, 28, p. 572] is now of common occurrence on *Gossypium hirsutum* in the Gadag tract, Bombay Province. Owing to the many sources of infection the only practical means of control lies in the selection and breeding of resistant varieties. In recent tests at the Department of Agriculture, Bombay, Kumpta Farm (K.F.) cotton (*G. herbaceum* var. *acerifolium*) showed high resistance, while R.22 (a Russian strain of *G. herbaceum*) was highly susceptible [see preceding abstracts]. The progeny of crosses between these two, initiated in 1946, were inoculated with suspensions of *X. malvacearum* and classified according to Simpson and Weindling's scale [ibid., 25, p. 448]. The ratios in the F_2 and back-cross generations agreed very closely on the basis of a single-gene difference with susceptibility partially dominant, thus corroborating Blank's results with Stoneville 20 (*G. hirsutum*) [ibid., 28, p. 573].

Hopf (M[aria]). **Schwarzfleckenkrankheit des Kartoffelkäfers durch Beauveria-Befall.** [Black spot disease of the Potato Beetle caused by *Beauveria* infection.] —*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, 5, pp. 96–97, 1952.

The cause of a black spotting of the larvae of the Colorado beetle (*Leptinotarsa* [*decemlineata*]) reported by E. Thiem (*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 5, p. 75, 1951) from the Colorado Beetle Research Station, Mühlhausen, Germany, was not definitely ascertained, but infection by *Beauveria* sp. was suspected. In order to verify this hypothesis, the writer inoculated a series of larvae and beetles with a fungus resembling *B. bassiana* [cf. *R.A.M.*, 18, p. 735] isolated from the affected insects. Up to 100 per cent. infection developed in the larvae, 86 per cent. in young beetles, and 30 per cent. in old ones [cf. ibid., 30, p. 106]. These results are considered to afford definite proof that *B.* (?) *bassiana* is responsible for the black spot disease of *L. decemlineata*, but the potential efficiency of the fungus in the biological control of the insect [cf. ibid., 14, p. 507] is regarded as very doubtful.

Eichler (W.). **Laboulbeniales bei Mallophagen und Läusen.** [Laboulbeniales on Mallophaga and Lice.]—*Repert. nov. Spec. Regn. veg.*, 54, 2–3, pp. 185–206, 53 figs., 1951.

Five new species of *Trenomyces* on Mallophaga are described in this critical study of the biology, morphology, and taxonomy of the genus.

Nickl-Navratil (Hilde). **Erfahrungen bei der Zucht anthraknose-resistenter Flachsstämme.** [Experiences in the breeding of anthracnose-resistant Flax strains.]—*Züchter*, 22, 7–8, pp. 228–232, 10 figs., 1952.

Best of all the flax strains selected at the Flax Research Institute, Temenice, near Šumperk, Czechoslovakia, for resistance to anthracnose (*Colletotrichum lini*) [*C. linicola*: *R.A.M.*, 32, p. 187] was Yugoslavia winter flax. It segregated into 16 physiological and morphological types, including five fully resistant, i.e., they showed no infection or at most a barely perceptible, quite innocuous, needle-prick tattooing of the cotyledons over the entire three-year period of observation (1946 to 1949). Other types yielding fully resistant strains were Tiroler Bauernflachs, Chinese fibre flax, Primitivlein-Hindukusch, and Canadian fibre flax.

Besides *C. linicola*, species of *Vermicularia* (which the author regards as a fundamentally different genus from *Colletotrichum* [cf. ibid., 8, p. 268]) were found to be

capable of causing anthracnose. The originally hyaline colonies of *Vermicularia*[1] slowly turn from faintly pink to light orange. The fuliginous sporodochia measure 201 to 402 by 93 to 201 μ. The length of the setae is 241·2 μ, and the spores are 11·5 to 18·4 by 2·3 to 3·9 μ. The fungus was highly pathogenic, rapidly inducing 100 per cent. infection on seedlings. The hyaline colonies of *Vermicularia*[2] soon turn smoke-grey to brownish-black. The cream-coloured, mostly falcate, biguttulate spores measure 13·4 to 20·7 by 4·5 μ. The pluricellular setae are 400 μ and upwards. The fungi grew best at 20° to 22° C. on carrot agar with a pH of 4 to 4·5.

The anthracnose fungi were accompanied by a vascular-parasitic *Fusarium* closely related morphologically and physiologically to *F. lini*. It seemed to impart to flax seedlings an enhanced susceptibility to anthracnose, while *Polyspora lini* acted in the same way on adult plants.

Protracted infection by *C. linicola* resulted in the development of variations in floral shape and colour and in the colour of the anthers, filaments, stigmas, and styles, but the most striking anomalies occurred in the colour, shape, and size of the seeds.

MARLATT (R. B.). **Races of Fusarium oxysporum f. lini in Arizona.**—*Diss. Abstr.*, 12, 4, p. 567, 1952.

At the University of Arizona 34 isolates of *Fusarium oxysporum* f. *lini* [*F. lini*: *R.A.M.*, 30, p. 270; 32, p. 67] obtained from wilted flax were compared to determine whether races of the fungus were present in the State. According to their behaviour on potato dextrose, malt, maize meal, and rice agars the isolates could be placed in 16, 21, 18, and 17 groups, respectively, or according to their growth rates 11, 19, 7, and 22 groups, respectively. No anastomosis or antagonism was observed. All the isolates differed in pathogenicity, as determined by soil inoculation tests with ten flax varieties, in the amount of post-emergence wilt, number of plants emerged, and those surviving after 50 days.

A toxic substance from a culture solution of one of the isolates inhibited seed germination in some varieties. Two varieties which grew well in an Arizona wilt plot were the least susceptible to the inhibitor.

Some of the Arizona isolates resembled 16 of the *Fusarium* isolates studied by Borlaug in Minnesota [ibid., 26, p. 490] in the amount of mortality occurring when certain varieties were grown in both regions.

MASSEY (L. M.). **What is the key to the control of blackspot on Roses?**—*Gdn J. N.Y. bot. Gdn*, 3, 1, p. 10, 1953.

It is reported that some of the dithiocarbamates (such as ferbam, dithane Z78, and parzate) and captan (orthocide 406) give effective control of rose black spot (*Diplocarpon rosae*) [*R.A.M.*, 30, p. 610] when applied up to twice a week during wet weather, care being taken that both leaf surfaces are adequately protected.

LEWIS (C. E.), STEWART (R. N.), & JEFFERS (W. F.). **Carnation wilt losses.**—*Flor. Rev.*, 109, 2827, pp. 25–26, 1952. [Abs. in *Biol. Abstr.*, 26, 9, p. 2317, 1952.]

With soil temperatures of 60° F. few carnations developed [unspecified] bacterial wilt [in the United States: *R.A.M.*, 20, p. 208] and the incubation period was long. Soil temperatures of 95° curtailed the incubation period from 2½ months to a fortnight and increased the incidence of infection from 20 to 100 per cent., all the plants being killed. The wounds on the roots necessary for the entry of the bacteria occur during potting. The immediate application of bacterial suspensions to the soil round newly potted plants resulted in infection, but the same treatment failed to induce symptoms a week after potting. The pathogen could also invade the plants through wounds in the aerial organs, though normally infection is through the soil, in which the fungus is capable of surviving for eight weeks.

Petrushova (Mme N. I.). Меры борьбы с мучнистой росой Роз. [Measures for the control of Rose downy mildew.]—Сад и Огород [*Orchard and Garden*], *1952*, 9, p. 76, 1952.

Treatment with green soap (2 per cent. dissolved in soft water) plus copper sulphate (2·5 gm. per 10 l. water, added afterwards) is recommended for the control of rose downy mildew [*Peronospora sparsa*: *R.A.M.*, 31, p. 608] at the first sign of the disease. In trials at the Nikitsky Government Botanical Garden, U.S.S.R., no infection followed this treatment compared with 55·8 per cent. on the untreated. In winter infected shoots should be cut out and the bushes sprayed with 5 per cent. ferrous sulphate.

Weintraub (M.) & Gilpatrick (J. D.). **An inhibitor in a new host of Tobacco ring spot virus.**—*Canad. J. Bot.*, 30, 5, pp. 549–557, 1 pl., 1952.

Of four seedling clones of *Dianthus barbatus* tested for susceptibility to tobacco ring spot virus [C.M.I. map No. 144; *R.A.M.*, 31, p. 435; 32, p. 60] at the Division of Botany and Plant Pathology, Ottawa, two were consistently infected, one occasionally missed infection, and the fourth was immune. Symptoms consisted of primary local lesions followed by systemic chlorosis and death of the growing point. Further adventitious growth was symptomless but still contained the virus and was protected from reinfection. Amorphous intracellular inclusions occurred in diseased leaves.

Difficulty in transmitting the virus to tobacco suggested the presence of an inhibitor in *D. barbatus* [cf. ibid., 31, p. 123]. A mixture of macerated leaves of infected tobacco and healthy *D. barbatus* was inoculated to various hosts by rubbing. Transmission to *D. barbatus* was unaffected but in cucumber, *Datura stramonium*, and snapdragon [*Antirrhinum majus*] the inhibitor either delayed symptom expression or rendered immune a proportion of the inoculated plants. Its presence in healthy leaves of carnation, *Dianthus chinensis*, *D. heuteri*, and *D. caesius* was demonstrated.

The dilution end point of the inhibitor lay between 10^{-2} and 10^{-3}. The severity of infection and the time elapsing before symptom expression was directly proportional to dilution. Loss of effectiveness was partial after 24 hours and complete after 72. The inhibitor withstood heating for 15 minutes at 60° and 70° C.; it reduced infectivity of tobacco mosaic virus to *Nicotiana glutinosa* and of cucumber mosaic virus and tobacco etch virus to tobacco.

Jenkins (Anna E.) & Bitancourt (A. A.). **Diagnosis of the Elsinoe on flowering Dogwood.**—*J. Wash. Acad. Sci.*, 38, 11, pp. 363–365, 2 figs., 1948.

A diagnosis is provided of *Elsinoe corni*, causing spot anthracnose of flowering dogwood (*Cornus florida*) [*R.A.M.*, 30, p. 110; 32, p. 81] in North Carolina, Delaware, and elsewhere in the south-eastern United States. The symptoms of the disease have already been described [ibid., 27, p. 476]. This constitutes the first record of the genus on Cornaceae.

Gladiolus yellows in N.S.W.—*Agric. Gaz. N.S.W.*, 63, 2, pp. 85–87, 5 figs., 1952.

Gladiolus yellows (*Fusarium orthoceras* var. *gladioli*) is reported for the first time on *Gladiolus* in three localities of New South Wales [cf. *R.A.M.*, 25, p. 303]. The symptoms and conditions favouring the development of the disease are described. One outbreak, which occurred in rather heavy soil and under cool to moderate temperature conditions, caused little damage in the field but considerable loss in storage. The annual treatment recommended in the United States of soaking the corms for two hours in 1 in 1,000 mercuric chloride [ibid., 28, p. 400] followed by a one minute dip in calomel suspension (1 lb. to 4 gals. water, plus a wetting

agent) is suggested. Early planting is also advised. Affected varieties included Ethel Cave Cole, Leading Lady, and Beacon, classified as resistant in America.

Blumer (S.). **Über zwei Schimmelpilze auf den Blütenständen von Poinsettia pulcherrima Willd.** [Concerning two moulds on the inflorescences of *Poinsettia pulcherrima* Willd.]—*Phytopath. Z.*, 19, 4, pp. 417–422, 2 figs., 2 graphs, 1952. [English summary.]

Poinsettia [*Euphorbia*] *pulcherrima* sustained severe damage in Swiss nurseries between 1950 and 1952 from *Botrytis cinerea* and *Penicillium stoloniferum*, which attack the inflorescences exclusively at the full-bloom stage, starting on the central cyathia and radiating towards the periphery. *B. cinerea* causes a brown to black discoloration and shrivelling of the smaller stalks, the infected cyathia generally dropping before the fungus fructifies. Stalks infected by *P. stoloniferum* turn yellow, while drops of latex are often exuded from the base; the cyathia fall at a slight touch. The mould sporulates profusely on the adherent cyathia, completely spoiling the market value of the plants.

The strain of *B. cinerea* used for inoculation experiments was isolated in 1944 from grapes. Despite several years in culture it was still producing conidia in abundance and proved highly pathogenic to *E. pulcherrima*, as well as to its original host. At 14° C. both the flowering of the plants and the progress of the moulds are slower than at 20°, but in relation to the numbers of cyathia open at a given moment infection by *B. cinerea* is twice as heavy at the former as at the latter temperature. Both moulds totally destroyed the inflorescences in 40 to 50 days at 18° to 20°.

Feder (W. A.). **Transit rot of Vanda Orchid blossoms.**—*Phytopathology*, 42, 7, pp. 373–376, 3 figs., 1 graph, 1952.

During the peak of the 1949–50 and 1950–1 winter seasons the flourishing Hawaiian Vanda orchid industry, a contributory factor in the economy of the Islands, sustained losses running into thousands of dollars from transit rot, caused by a complex of *Botrytis*, *Gloeosporium* [cf. *R.A.M.*, 31, p. 186], and *Alternaria* spp., in the Miss Joaquim variety. The symptoms do not ordinarily appear until three to five days after packing in cardboard boxes containing damp cotton pads or other humidifying material and sealed in different ways. They take the form of irregular, chocolate-brown spots on the sepals and petals, which expand and spread over the whole blossom, or marginal browning at the points of contact with the moist pads. The affected flowers become flaccid and soggy, ultimately breaking down completely and becoming covered with *Botrytis* fructifications. The entire foregoing process occupies a period of 8 to 14 days. Somewhat later the fructifications of the *Gloeosporium* and the *Alternaria* may also be observed.

The originally white, translucent, concentric *Gloeosporium* spots, with entire margins, subsequently turn a darker brown than those induced by *Botrytis*. This phase of the disease may be detected in the field, as may also the 'pock-marking' caused by *Alternaria* sp., minute, brown flecks usually appearing on older flowers or damaged portions of young ones and finally spreading all over them. The shrivelled condition of the blooms attacked by the *Alternaria* contrasts with the watery rot associated with the other two organisms.

In inoculation experiments on healthy packed orchids at 12°, 16°, 20°, and 24° C. with spore suspensions of the three fungi, each produced its specific symptoms, which became almost indistinguishable, however, as incubation proceeded. *Botrytis* sp. was more active at the lower temperatures and the other two at the upper. At the end of three weeks all the inoculated flowers were decomposed while the controls were still healthy. The pathogens were recovered from the diseased material.

In determinations of the radial growth of *Botrytis*, *Gloeosporium*, and three isolates of *Alternaria* at eight temperatures ranging from 4° to 32°, *Botrytis* sp. reached a peak at 12° and maintained this maximal level to 24°, above which the rate fell sharply. The optimum for the other species was 20° or above, with a drop at 32°, except for one strain of *Alternaria* which grew well at 32°. The average weekly field temperature in a rot-infested Oahu field was 64° F. for the period from November, 1950, to the end of February, 1951, representing the optimum for *Botrytis* and a favourable level for *Gloeosporium* but too low to permit of infection by *Alternaria*. The usual packing, shipping, and holding temperature for Vanda orchids is about 55°, which explains the prevalence of transit rot in certain endemic areas and the predominance of *Botrytis* in its causation.

The rot was effectively combated by atomization of the flowers with natriphene [ibid., 30, p. 372], dowicide A (both at 1 in 2,000), or dehydroacetic acid (1 in 1,000), all of which, however, were phytotoxic, especially the last-named.

Hardison (J. R.) & Corden (M. E.). **A serious outbreak of dwarf bunt in Tall Oat Grass in Oregon.**—*Plant Dis. Reptr*, 36, 9, pp. 343–344, 2 figs., 1952. [Multilithed.]

Dwarf bunt (*Tilletia brevifaciens*) [*R.A.M.*, 31, p. 378; 32, p. 15] was observed in Union County, Oregon in 1952 infecting Tualatin oat grass (*Arrhenatherum elatius* ? var. *bulbosum*) in five fields in which severe infection had previously occurred on wheat [loc. cit.]. Incidence of dwarfed culms varied from a trace to about 50 per cent. The difference in height between infected and healthy culms may permit combine harvesting above the diseased panicles. From July, 1952, the Oregon standards for grass seed certification include 0·5 per cent. dwarf bunt as the maximum tolerance allowed in field inspection and zero for whole bunt balls in seed inspection.

Andersen (H.). **1.–3. års beretning fra Statens Plantetilsyn vedrørende frøpatologisk kontrol. 1 April 1948–31 Marts 1951.** [First to third annual report of the State Plant Inspection Service on the pathological inspection of seeds. 1st April, 1948 to 31st March, 1951.]—*Tidsskr. Planteavl*, 56, 1, pp. 67–86, 1952. [English summary.]

New records for Denmark in this report, which is based largely on the work of Dr. P. Neergaard at the J. E. Ohlsen phytopathological laboratory, now discontinued [*R.A.M.*, 31, p. 224], are *Helminthosporium siccans* [*Pyrenophora lolii*: ibid., 28, p. 128] on *Festuca pratensis*, *F. rubra*, *Lolium multiflorum*, *L. perenne* [loc. cit.], *Poa trivialis*, *P. pratensis*, and *Phleum pratense*, and *H. sativum* on *F. rubra*, barley, and *L. multiflorum*.

Grasso (V.). **Le Claviceps delle Graminacee italiane.** [*Claviceps* on Italian Gramineae.]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 747–784, 6 pl., 5 graphs, 3 maps, 1952. [English summary.]

In this further account of his studies of *Claviceps* species attacking Gramineae and Juncaceae in Italy [*R.A.M.*, 29, p. 566; 30, p. 474, and next abstract] the author lists 46 hosts, mostly new, and gives details of his morphobiological, statistical, and biological investigation of the forms found on them. On 20 hosts the conidial state with the insect vectors was studied, also the sclerotial states, a key to which is presented. Investigation was also made into sclerotial germination under laboratory and natural conditions and the factors adversely affecting it. Germination in the laboratory ranged from 90 to 95 per cent. for sclerotia from *Paspalum dilatatum* and *P. distichum* to 10 to 15 per cent. for those from *Holcus lanatus*.

On most hosts the sclerotia began to form 15 to 20 days after the disappearance of the conidia, though on *Arundo phragmites* [*Phragmites communis*], *Paspalum dilatatum*, and *P. distichum* over three months passed. The period necessary for complete development was usually 20 to 25 days, though on the three hosts named it was 40 to 45 days. This period coincides with the final stage of vegetation of the grass, the sclerotia maturing with the caryopses. On most hosts the sclerotia were longer and wider than the caryopses and weighed more.

The sclerotia were spheroidal on *Paspalum* and indistinguishable on the two species, straight on *Agropyron repens*, arcuate and smooth on *Anthoxanthum odoratum*, comma-shaped on *Cynodon dactylon*, and curved inwards on almost all the other hosts. On *Phragmites communis* some were almost spiral. At maturity most were violaceous-brown or reddish, though on *Paspalum dilatatum* and *P. distichum* they were greyish-yellow. The largest (4·5 to 55 by 1·5 to 7 mm.) were on rye and the smallest (1·9 to 2·9 by 0·3 to 0·5 mm.) on *Milium multiflorum*. Among the largest sclerotia those on rye were curved, squat, and often split longitudinally and radially; those on *Brachypodium pinnatum* were very long and not very massive; those on *Lolium temulentum* var. *speciosum* were squat and curved in the upper part; those on *Dactylis glomerata* were always curved and conspicuously angular. Among the smallest those on *Holcus mollis* and *H. lanatus* were plurigibbous and curved. The external pseudoparenchyma of the sclerotium was composed of polygonal cells measuring 7·5 to 10 by 2·5 to 10 μ with hyaline walls 1 to 1·5 μ thick, the outermost being brown. The internal pseudoparenchyma, only one-third or one-quarter as thick as the outer, consisted of hyaline, round cells measuring 5 to 3 by 3 to 2 μ.

The capitula ranged in size from 558 to 985 by 465 to 744 μ on *M. multiflorum* to 2,046 to 2,790 by 1,395 to 1,674 μ on wheat; perithecia from 150 to 170 by 62 to 100 on *M. multiflorum* to 162 to 300 by 75 to 162 μ on rye; asci from 82 to 159 by 2·7 to 3·1 μ on *M. multiflorum* to 127 to 148 by 2·7 to 3·9 μ on *Lolium perenne*; ascospores from 58 to 91 by 0·8 to 1 μ on *M. multiflorum* to 98 to 159 by 0·4 to 0·6 μ on *Gaudinia fragilis*.

GRASSO (V.). **Le Claviceps delle Graminacee italiane. Parte II.** [*Claviceps* on Italian Gramineae. Part II.]—*Ann. Sper. agr.*, N.S., 6, 4, pp. 973–1,004, 1952. [English summary.]

In this second part of the present study [see preceding abstract] the author describes the form of the parasite on the 46 hosts affected by species of *Claviceps* in Italy [*R.A.M.*, 31, p. 379], with details of germination of sclerotia, physiological effects, and growth in culture.

CORMACK (M. W.). **Winter crown rot or snow mould of Alfalfa, Clovers, and grasses in Alberta. II. Field studies on host and varietal resistance and other factors related to control.**—*Canad. J. Bot.*, 30, 5, pp. 537–548, 1 pl., 1952.

In further studies in this series [cf. *R.A.M.*, 27, p. 526] numerous cultivated and indigenous plants were tested for resistance to the low-temperature basidiomycete causing winter crown rot or snow mould of lucerne, forage legumes, and grasses in Alberta [ibid., 31, p. 332] by inoculations made in late autumn, or by planting in infested land. In addition to the results already reported rhubarb and chives appeared to be immune, raspberry, peony, and columbine (*Aquilegia vulgaris*) resistant, and strawberry and tulip highly susceptible.

ZACHOS (D. G.). **Recherches sur la désinfection des graines du Pois-chiche (Cicer arietinum L.) infectées par l'Ascochyta rabiei (Pass.) Labr.** [Studies on the

disinfection of Chick Pea seeds (*Cicer arietinum* L.) infected with *Ascochyta rabiei* (Pass.) Labr.]—*Ann. Inst. phytopath. Benaki*, 5, 2, pp. 76–87, 1951. [Received 1952.]

Anthracnose of chick pea (*Cicer arietinum*) caused by *Ascochyta rabiei* [C.M.I. map No. 151; *R.A.M.*, 28, p. 51] has become endemic in most areas of Greece to the extent that healthy seeds are virtually unobtainable. Experiments on the control of this disease were therefore undertaken, badly infected seed from the Plant Improvement Station, Messara, Crete, being used. The seeds were first immersed for one minute in 96 per cent. alcohol followed by one to two minutes in 1 in 1,000 mercuric chloride solution, then washed in sterile, distilled water before receiving one of several test treatments. They were finally washed to remove all traces of the chemicals, sown on plates of potato dextrose agar, incubated at 20° to 21° C., and examined after 8, 15, and 22 days.

Soaking in 5 per cent. glacial acetic acid for one minute, 1 per cent. for five minutes, or 0·05 per cent. for four hours destroyed the parasite in 60, 56·3 and 56 per cent. of the seeds, respectively. In five tests immersion for two hours in 0·005 per cent. malachite green gave an average of 84 per cent. control. Three tests, each of four hours in 0·05 per cent. formalin solution (37/41 per cent.), gave an average of 93·3 per cent. control. Immersion for ten minutes in hot water at 45° to 47° destroyed the fungus in 85·8 per cent. of the seeds and in 87·5 per cent. when the same treatment was preceded by a three-hour soak in water at 20°. Sattar's hot water method [ibid., 13, p. 347] impeded germination.

It is concluded that formalin and malachite green offer the best prospect of control, but the results need to be supplemented by field tests.

Verona (O.). **Intorno alla presenza nelle zone del litorale toscano di malattie dei fruttiferi ad eziologia incerta.** [On the presence in the coastal areas of Tuscany of diseases of fruit trees of uncertain etiology.]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 615–622, 8 pl., 1952. [English summary.]

Peach trees of all ages and varieties, early and late, growing in the Italian provinces of Livorno, Pisa, Lucca, and Massa are affected by the non-parasitic decline reported from Venezia Giulia [*R.A.M.*, 26, p. 18]. In Lucca mortality is about 20 per cent. Non-parasitic plum wilt [ibid., 14, p. 320] is less serious, though heavy losses are sustained in the province of Pisa, particularly in hilly regions; in one orchard at S. Gervasio mortality was 30 to 40 per cent. Cases of non-parasitic pear wilt [ibid., 14, p. 317; 32, p. 84] are not common, the only serious outbreak being on the early variety Gentil Bianco near Pontasserchio. Non-parasitic persimmon wilt [ibid., 27, p. 327] occurs near Pontasserchio in the province of Pisa and at Castagneto Carducci, in Livorno, on trees growing in the vicinity of peach trees with non-parasitic decline. Fasciation, heteromorphosis, and giantism are sometimes present on olive leaves in Garda. In all parts of the coastal area of Tuscany cherries are seriously affected by decline [ibid., 29, p. 368]. One case of fig mosaic [cf. ibid., 31, p. 616] was observed near Castagneto Carducci.

Delmas (H. G.) & Bernard (R.). **La carence en zinc des arbres fruitiers.** [Zinc deficiency of fruit trees.]—*Bull. tech. Inform. Ingén. Serv. agric.* 60, pp. 365–373, 1951. [Abs. in *Biol. Abstr.*, 26, 5, p. 1220, 1952.]

Zinc deficiency, often associated with iron-induced chlorosis [*R.A.M.*, 30, p. 376], has been diagnosed by Roach's petiole injection technique on apple, pear, and particularly peach trees in central and south-western France [ibid., 31, p. 494]. Control measures include cultivation of lucerne and application of zinc in fertilizers, sprays, and injections.

Zobrist (L.) & Fröhlich (H.). **10 Jahre Versuche zur Bekämpfung des Apfelmehltaues (Podosphaera leucotricha (E. et E.) Salm.).** [Ten years' experiments in the control of Apple mildew (*Podosphaera leucotricha* (E. & E.) Salm.).]—*Phytopath. Z.*, 19, 4, pp. 431–440, 4 figs., 1952. [English summary.]

Much of the information in this report of experiments on the control of apple mildew (*Podosphaera leucotricha*) in Switzerland has already been presented from other sources [*R.A.M.*, 31, p. 495 *et passim*]. Dormant sprays do not destroy the mycelium overwintering in the buds and primary infections are inevitable. The thick mat of conidiophores requires a spray mixture of highly efficient wetting capacity, necessitating the addition of a spreader and thorough 'washing' with twice the usual quantity of spray mixture. In a systematic experimental programme at the Biological Laboratory of Dr. R. Maag A. G., Dielsdorf-Zürich, the best results were obtained in 1951 with seven applications (on 11th April, 1st and 23rd May, 5th and 20th June, 11th July, and 10th August) of micronized wettable sulphur plus a spreader, which reduced the incidence of secondary infection (at the final count on 25th September) from 97 for those untreated for five years and 68 for those untreated in 1951 to 5 per cent. The fungicide was used at a concentration of 0·75 per cent. for the first three sprays and at 0·5 per cent. thereafter, and the spreader at 0·2 per cent. until the last treatment (0·1). Great importance is attached to the rapid succession of the pre-blossom and petal-fall applications, and to repetition of the treatments over a period of years. The same schedule is effective against scab [*Venturia inaequalis*].

Taylor (J.). **Some north Georgia Apple problems.**—Abs. in *Phytopathology*, 42, 5, p. 288, 1952.

In northern Georgia apple orchards black rot (*Physalospora obtusa*) [*R.A.M.*, 32, p. 26] is responsible for heavier losses to growers than all other diseases and pests combined. Counts of prematurely shed fruits in 1951 revealed 62 per cent. black rot infection, involving 73 per cent. Golden Delicious, 60 per cent. Red Delicious, and 30 per cent. Stayman Winesap. Leaf symptoms were more severe in orchards sprayed with Bordeaux mixture [ibid., 31, p. 190] than in those treated with ferbam.

Horn (N. L.). **Diplodina on Peach in Louisiana.**—*Plant Dis. Reptr*, 36, 9, p. 351, 1 fig., 1952. [Multilithed.]

The fungus associated with diseased peach fruits and stems at the North Louisiana Hill Farm Experiment Station, Homer, and in orchards near Ruston, Louisiana, was tentatively identified as a species of *Diplodina*. The fruit symptoms, which are somewhat similar to those caused by *Sclerotinia* [*fructicola*: *R.A.M.* 32, p. 26], are briefly described. Embedded in the brown, later black stromatic masses are pycnidia containing bicellular conidia, 28 by 6 μ. The disease was reproduced by inoculation, the fungus being reisolated.

Stout (G. L.), Schlocker (A.), & Wagnon (H. K.). **Peach yellow bud mosaic.**—*Bull. Calif. Dep. Agric.*, 41, 2, pp. 53–57, 2 col. pl., 3 figs., 1952.

In April, 1952, peach yellow bud mosaic virus [*R.A.M.*, 31, p. 228] was found near Loomis, northern California. It appears to spread typically from infected to adjacent trees, but also over longer distances and from orchard to orchard. A focus of infection often occurs in or near the outside row of an orchard, and spread to adjacent trees is at first in a semicircular area, later enlarging irregularly.

Control and suppression depend on repeated inspections in April and May, with prompt removal of all affected trees and use of healthy propagating material only.

Govi (G.). **Due specie di Cylindrocarpon isolate da fruttiferi.** [Two species of *Cylindrocarpon* isolated from fruit trees.]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 793–804, 2 pl., 6 figs., 1 graph, 1952. [English summary.]

Cylindrocarpon radicicola [cf. *R.A.M.*, 31, p. 222, *et passim*], not before reported from Italy, was isolated from wilting two-year-old *Prunus myrobalana* [*P. cerasifera*] trees in the vicinity of Agro Romano In the trunk were necrotic sectors, discoloration being marked in the cortex and fainter near the centre. The xylem elements in the necrotic zones were partly or completely occluded by gummy tyloses and the perivascular cells were quite dead. The trees appeared to have been injured by frost. Inoculations of adult *P. cerasifera* trees in optimum vegetative conditions with an isolate from affected material produced in four months characteristic necrosis of the tissues spreading transversely from the inoculation site to the central pith and longitudinally to an average height of 6 cm. The fungus was reisolated from the affected parts.

C. obtusisporum [cf. ibid., 16, p. 813; 17, p. 116], also not before recorded from Italy, was isolated from two-year-old peach trees of an unidentified variety near Ravenna. In the spring of 1951 vegetation became completely arrested. Sections of the trunks and roots showed conspicuous discoloration of the cortex and wood, but there were no special morphological alterations of the tissues, though the walls of the cambium and cortex were deeply discoloured and there was marked formation of gum occluding the wood.

Hochapfel (H.). **Die Cylindrosporium-Krankheit an Süss- und Sauerkirschen in Europa und Nordamerika.** The *Cylindrosporium* disease on sweet and sour Cherries in Europe and North America.]—*Phytopath. Z.*, 19, 4, pp. 389–402, 6 figs., 1952.

Cherry leaf spot appears to be widely distributed in western Germany [*R.A.M.*, 31, p. 499], having been reported, since its detection at an Upper Franconian nursery in May, 1951, from Württemberg-Baden, Bavaria, Lower Saxony, and Schleswig-Holstein, where it affects both sweet and sour varieties, while in the Odenwald and Black Forest wild cherries also are attacked.

The systematic position and nomenclature of the causal organism are fully discussed, and the author explains his preference for the retention of the name *Cylindrosporium padi* sensu lato pending the demonstration of its connexion with *Coccomyces hiemalis*. The recent almost simultaneous outbreaks of leaf spot in four European countries are attributed to a gradual accession of virulence in the leaf spot fungus rather than the introduction of pathogenic material from North America.

The biology and control of the fungus are briefly considered in the light of contributions to the foreign literature and observations in Germany.

[An abridged version of this paper appears in *NachrBl. dtsch. PflSchDienst.* (*Braunschw.*), *Stuttgart*, 4, pp. 97–100, 3 figs., 1952.]

Miller (P. W.). **Preliminary tests of wild Strawberries from eastern Oregon for the presence of virus infection.**—*Plant Dis. Reptr*, 36, 9, p. 352, 1952. [Multilithed.]

In tests at Oregon Agricultural Experiment Station in 1951 to determine the extent of virus infection in various wild strawberries in eastern Oregon, an area not covered by earlier investigations [*R.A.M.*, 30, p. 524], *Fragaria ovalis* and *F. vesca* plants from six widely separated localities, all over 100 miles away from the nearest strawberry field, were stolon grafted to healthy *F. vesca* (East Malling strain) [ibid., 31, p. 441; 32, p. 87]. Of the 53 plants tested all but one (*F. ovalis*) were virus-free, indicating that infection in eastern Oregon may be less than it is west of the Cascade Mountains.

Marcus (C. P.). **Survey for virus-infected wild Strawberry plants in eastern United States.**—*Plant Dis. Reptr*, 36, 9, pp. 353–354, 1952. [Multilithed.]

The results of a survey begun in the autumn of 1951 showed that wild strawberry plants are infected with strawberry viruses 1 and 2 and serve as a source of infection for virus-free commercial strawberry stocks in seven of the eastern United States [*R.A.M.*, 31, p. 288 and preceding abstract]. The elimination of wild strawberries from the vicinity of planting sites and the isolation of virus-free plantings by at least 3,000 ft. from other commercial fields and wild plants are strongly recommended.

Posnette (A. F.). **Heat inactivation of Strawberry viruses.**—*Nature, Lond.*, 171, 4346, p. 312, 1953.

Experiments on heat therapy of strawberry plants infected with crinkle viruses were begun in 1950 at East Malling Research Station, Kent. Graft tests to the sensitive indicator *Fragaria vesca* in 1951 and 1952 demonstrated that the mild crinkle virus [*R.A.M.*, 31, pp. 171, 390] was inactivated in a Perle de Prague plant by oven treatment at 33° C. and in one Huxley's Giant the virus content was reduced.

In 1952 seedlings growing in 3-in. pots with all but the youngest leaf removed were subjected to 37°±2° for periods ranging from five to 12 days. The plants giving no transmission were retested with aphids [*Pentatrichopus fragaefolii*] and those again yielding no virus were grafted to *F. vesca*. Inactivation was apparently complete in the varieties Early Cambridge, Huxley's Giant, and Perle de Prague.

The lowest temperature-time for inactivation was 33° for six days, while eight days at 37° gave the most reliable results although some plants were killed. None survived more than 11 days at this temperature.

The viruses inactivated (in the probable order of their sensitivity to heat) were an undescribed virus causing severe leaf necrosis on Royal Sovereign and bud proliferation on *F. vesca*, mild crinkle [ibid., 32, p. 135], and crinkle [ibid., 28, p. 341]. The yellow edge virus was not included in these experiments.

Plants previously thought to be infested with single viruses on the basis of vector and graft tests were shown by heat therapy to contain at least two, one of which was inactivated more rapidly than the other. Some plants which had given no transmission by aphids a few weeks after treatment gave transmissions three months later, presumably owing to resurgence of virus from deep-seated tissues.

Plants in a frame receiving daylight survived 37° for three days longer than those in the dark oven. Warm water killed them more quickly than air at the same temperature, and they survived longer incubation when the soil was moistened daily to prevent wilting than when it was saturated. Well-rooted plants withstood heat treatment better than recently potted ones. More survived in vermiculite than in steam-sterilized soil.

Nolte (H.-W.). **Neuere Beiträge zur Analyse des Komplexes Himbeerrutensterben.** [Recent contributions to the analysis of the Raspberry cane blight complex.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, 8, 147–149, 2 figs., 1952.

From a perusal of five contributions to the relevant literature the author concludes that raspberry cane blight in Germany [*R.A.M.*, 31, p. 444] and England [ibid., 32, p. 86] is due to a complex of four factors, namely, unfavourable soil conditions, cortical fissures, the raspberry cane midge (*Thomasiniana theobaldi*), and the fungi *Didymella applanata* and *Leptosphaeria coniothyrium*.

Cann (H. J.). **Bunchy top virus of Bananas 'at all time low' in N.S.W.** —*Agric. Gaz. N.S.W.*, 63, 2, pp. 73–76, 4 figs., 1952.

The symptoms and spread of bunchy top virus disease of banana and the history

of its development and control in New South Wales [*R.A.M.*, 32, p. 175] are briefly described. The disease, no longer a limiting factor in banana production and now rarely found in its advanced stages, has steadily declined since 1937 to 15 infected plants per 100 acres in 1951 and is altogether absent in many areas which were once badly affected. The cost of control is about £28,000 per year.

Hammarlund (L.). **Vædskemængde og styrke ved sprøjtning.** [Amount and concentration of spray mixtures.]—*Erhvervsfrugtavleren, 1952*, 12, pp. 325–328, 1952.

Directions are given for the quantities and concentrations of herbicidal, insecticidal, and fungicidal spray mixtures applicable for various purposes, with the several types of apparatus available in Norway, including mist, high- and low-pressure, barrel, and knapsack sprayers [cf. *R.A.M.*, 31, p. 617].

Garton (J. E.) & Morton (M. J.). **A graphic method of calculating spray mixes.**—*M P Okla. agric. Exp. Sta.* 23, 7 pp., 1951. [Abs. in *Biol. Abstr.*, 26, 9, p. 2322, 1952.]

A graphic method of calculating fungicidal and other kinds of spray mixtures is presented. The nomographs relate the pounds of active ingredient to the gallons of spray material to be mixed and applied per acre, and the pounds of active ingredient per gallon of concentrate (or the percentage by weight of wettable powder) and the amount required. By means of a third nomograph percentage strength by weight can be converted to pounds of active ingredient per gallon.

Courshee (R. J.). **Fog spraying.** *Comm. Gr., 1953*, 2976, pp. 64–65, 2 figs., 1953.

Various methods of fog spraying, which involves ultra-small volumes (under 5 gals. per acre), the advantages of low-volume spraying [*R.A.M.*, 32, p. 195], e.g., speed and economy of labour and materials, the costs, and physical factors involved, are briefly described. The best atmospheric conditions for fog spraying appear to be in a closed glasshouse or if outdoors probably at night, provided there is no wind. For large-scale work the Swingfog thermal aerosol generator, a small, compact, light-weight machine (carried and operated in the hand), with a single-pulse motor for both forming and propelling the fog, is most suitable and inexpensive. The fog is generated at high temperature. Microsol sprayers atomize the spray, thus avoiding the possible instability of many insecticides at temperatures near their boiling point, by spinning it off the edge of a rotating disk at high speed. The liquid is fed through the axle of the disk shaft, the drop size decreasing with increasing disk speed.

Schrödter (H.). **Agrarmeteorologische Beiträge zu phytopathologischen Fragen mit besonderer Berücksichtigung der Bedeutung des Mikroklimas für Pflanzenkrankheiten.** [Agrario-meteorological contributions to phytopathological questions, with special reference to the importance of the microclimate for plant diseases.]—*Abh. met. Dienst. Aschersleben*, 2, 15, 3 diags., 14 graphs, 1952.

This is a critical discussion of 201 important contributions to meteorology in relation to cultivated crops which have appeared during the last 12 years or so, with special reference to the influence of the microclimate on plant diseases, supplemented by the author's observations and experiments at the Agrario-Meteorological Research Station, Aschersleben, Saxony [*R.A.M.*, 31, p. 587].

Current methods of experimentation are criticized as giving undue weight to the results of laboratory tests and to the statistical appraisal of climatological mean and summation values; the need for more attention to field trials is emphasized. In connexion with the cabbage disease caused by *Alternaria* spp., including *A.*

circinans [*A. brassicicola*: cf. ibid., 31, p. 444], a method has been devised for the direct comparison of the results of laboratory and outdoor experiments. The great significance of dew in the development of plant pathogens is stressed, and a thermo-electrical method is described for the direct determination of the duration of wetting from dew [cf. ibid., 30, p. 299].

Further examples of the importance of microclimatic factors are represented by the temperatures of the siliquae of Savoy cabbage and cauliflower in relation to an [unspecified] anthracnose and of the cortex of raspberry canes affected by [unspecified] die-back.

Sarejanni (J. A.). **Essai sur le concept de la maladie en pathologie végétale.** [A dissertation on the disease concept in plant pathology.]—*Ann. Inst. phytopath. Benaki*, 5, 2, pp. 88–127, 1951. [Received 1952.]

The author traces (with 55 references to the literature and to specific disorders) the history of the plant disease concept from classical Greek literature up to the present, considering it from the aspects of disease in general and in particular and as a pathological process. All diseases, infectious or not, are recognized by certain well-defined 'morbidity characters', such as morphological, histological, and cytological abnormalities, the presence in the tissues of foreign inclusions, infectivity, early death, and certain serological properties. A particular disease, therefore, is a systematic grouping of several of these characters forming an organic whole, which is capable of being repeated indefinitely. Throughout the work the author emphasizes that the 'morbidity characters' are not defined in relation to the disease, but are considered as well-defined concrete data which exist quite apart from the idea of disease.

Paddock (W. C.). **The new frontier for plant pathology.**—*Plant Dis. Reptr*, 36, 9, pp. 370–372, 1952. [Multilithed.]

In this discussion of the significance of plant pathology in present-day agriculture the author stresses the need for more plant pathologists in underdeveloped countries, pointing out the particular scope in such countries for their work and that of plant breeders in increasing crop yields cheaply and efficiently through disease control. A wider interest should be taken in plant diseases, some of which might be very destructive in the United States should they ever be introduced [cf. *R.A.M.*, 32, p. 171]. An example of the danger of lack of information is cited: two maize diseases due to *Sclerospora* [including *S. maydis*] in Indonesia [cf. ibid., 29, p. 256] could destroy every United States maize variety so far tested.

Gäumann (E. A.). **The fungi. A description of their morphological features and evolutionary development.**—420 pp., 426 figs., 14 diags., New York—London, Hafner Publishing Company, 1952. 72*s*. 6*d*.

This is a translation, arranged as an American text, by F. L. Wynd of the author's treatise, which has already been noticed from the original German [*R.A.M.*, 29, p. 110].

Moreau (F.). **Les champignons. Tome I.** [The fungi. Volume I.]—(*Encycl. mycol.*, 22), xv+940 pp., 395 figs., 51 diags., 19 graphs, Paris, Paul Lechevalier, 1953. Fr. 11,000.

The first volume of this treatise on fungi is divided into two parts; the first, after a general introductory chapter, comprising chapters II to XIV, is devoted to physiology; III (pp. 35–58) deals with pure cultures and XI (pp. 252–302) with parasitism. Part 2 is concerned with morphology and development and includes chapter XVII (pp. 497–508) on fixing and staining techniques; XIX and XX (pp.

552–611) on biologic forms; XXI and XXII (pp. 612–659) on dispersal of spores; XXIV (pp. 672–701) on the problem of sexuality of fungi; XXV (pp. 702–732), XXVI (pp. 733–748), XXVII (pp. 749–771), and XXVIII (pp. 772–791) on heterothallism in the lower fungi, Ascomycetes, Basidiomycetes, and Protobasidiomycetes, respectively; XXIX (pp. 792–833) and XXX (pp. 834–881) on genetics; and XXXI (pp. 882–940) on the evolution of sexuality. Each chapter or important section thereof is furnished with a bibliography; another containing classical or frequently cited works precedes the introduction.

Tirelli (M.) & Santini (Lea). **Varietà di piante coltivate in Italia resistenti a malattie e a cause avverse.** [Varieties of plants cultivated in Italy resistant to diseases and adverse factors.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 217–268, 1951.

Tables are given listing the species and varieties of cultivated plants and some trees grown in Italy and indicating their resistance or susceptibility to parasitic and other diseases, as recorded in the literature. Brief notes are also included on adaptability to different types of climate and soil, regions where grown, and other relevant matters.

Goidànich (G.) & Bernadi (Carla). **Sulle alterazioni dell' apparato radicale e del colletto prodotte da miceli di basidiomiceti sterili.** [On injuries to the root system and collar produced by mycelia of sterile basidiomycetes.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 3–10, 6 figs., 1951. [English summary.]

This paper on root and collar rots of cabbage, barley, grasses, and other plants caused by sterile mycelia of basidiomycetes has already been noticed from another source [*R.A.M.*, 28, p. 633].

Gupta (D. D.). **Sporulation and aversion in Eurotium herbariorum (Wigg.).**—*Indian Phytopath.*, 4, 2, pp. 106–115, 1 pl., 1 graph, 1 chart, 1951. [Received 1952.]

The results of investigations at the University College of North Wales, Aberystwyth, on the physiology and cytology of *Eurotium* (*Aspergillus*) *herbariorum* [cf. *R.A.M.*, 14, pp. 585, 671], using the strain isolated by Barnes [ibid., 8, p. 192], confirmed the findings of Fraser and Chambers (*Ann. mycol., Berl.*, 5, p. 419, 1907). It seems probable that parthenogenetic development of the ascus may occur sometimes. Rate of colony advance is more or less constant under any particular set of conditions and is of the non-staling type. Low temperatures retarded vegetative growth and production of conidia and perithecia, but they developed well at about 30° C. and in continuous darkness. Continuous light stimulated conidial production but inhibited perithecial formation irrespective of temperature (i.e., from 20° to 36°). Although the organism is homothallic, mycelia derived from different monoconidial cultures gave some evidence of aversion; mycelia derived from the same monoconidial culture did not.

Mezzetti (A.). **Ricerche sulla biologia della Melanospora damnosa (Sacc.) Lindau. III. Contributo. Ricerche morfologiche.** [Researches on the biology of *Melanospora damnosa* (Sacc.) Lindau. Contribution III. Morphological researches.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 25–42, 3 pl., 8 figs., 1951. [English summary.]

This paper has already been noticed from another source [*R.A.M.*, 28, p. 643].

Aschan (Karin). **Studies on dediploidisation mycelia of the basidiomycete Collybia velutipes.**—*Svensk bot. Tidskr.*, 46, 3–4, pp. 366–392, 4 pl., 3 diags., 2 graphs, 1952.

At the University of Uppsala, Sweden, a micrurgical technique was used to secure neohaplonts of *Collybia velutipes* from dikaryotic mycelia [cf. next abstract], using a modification of Harder's method (*Z. wiss. Mikr.*, 44, 1927). The mycelia were cultured in an oil chamber on cellophane saturated with wort solution. A fragment of mycelium was crushed in a drop of sterile water, from which clamp-bearing hyphae could be selected and transferred singly or in small groups to the cellophane, where growth began after 24 to 48 hours. The micrurgical operation must be performed when the clamp has reached an appropriate stage in its development, either just before or as the clamp tip comes into contact with the hyphal wall, 34 to 45 minutes after initiation. Neighbouring dikaryotic cells are killed by puncturing with a glass needle. All cells except the operation cell must then be removed, and after about a week, when the operation mycelium has reached the edge of the cellophane strip, one end of the cover-glass is raised to allow most of the oil to run off and the strip is loosened and placed, culture side upwards, on a malt agar plate.

Fries (N.) & Aschan (Karin). **The physiological heterogeneity of the dikaryotic mycelium of Polyporus abietinus investigated with the aid of micrurgical technique.**—*Svensk bot. Tidskr.*, 46, 3–4, pp. 429–445, 1 pl., 1 diag., 5 graphs, 1952.

By means of a micrurgical method [see preceding abstract] single cells were isolated at the University of Uppsala, Sweden, from two monokaryotic mycelia of *Polyporus* [*Polystictus*] *abietinus* [*R.A.M.*, 20, p. 613], one freshly isolated and the other derived from an old, degenerate laboratory strain, and allowed to develop into new 'single-cell' mycelia. Each such mycelium closely resembled its parent strain. From the dikaryotic mycelium produced by pairing the two, 19 monokaryotic cultures, termed neohaplonts, were isolated, nine of which (all possessing the nucleus of the fresh strain) developed into mycelia, while the other ten (presumed to be carrying the nucleus of the degenerate parent) died. Most of the neohaplonts differed markedly from the parents in their morphological or physiological characters or both.

DeCoursey (J. D.) & Webster (A. P.). **Inhibition of growth of a mold quantitated to demonstrate the effect in insect specimen boxes.**—*J. N.Y. ent. Soc.*, 40, 3, p. 183–188, 2 graphs, 1952.

Tests at the Naval Medical Field Research Laboratory, Camp Lejeune, North Carolina, showed that the growth of a species of *Penicillium* on Sabouraud's dextrose agar plates was completely inhibited for eight days by the presence of naphthalene [*R.A.M.*, 25, p. 345] crystals in the dish. Growth was then resumed very slowly for a few days.

Turner-Graff (Ruhama). **An effective use of Petri dishes for microcultures.**—*J. gen. Microbiol.*, 7, 1–2, pp. 31–35, 1 pl., 1952.

A microtechnique for growing several cultures in one Petri dish was developed at the Dairy Research Laboratory, Agricultural Research Station, Rehovot, Israel. Measured drops of agar pipetted into the dish and also on to the lid form small, separate plaques, 8 to 30 per dish. Assay cylinders may be embedded in the drops before they set. Antagonism may be studied by pouring elongated plaques (two or three drops in a row) and inoculating at opposite ends. The plaques retain sufficient moisture for the duration of the assay when incubated at temperatures up

to 37° [C.] or up to two weeks at room temperature. The method has also been adapted for the isolation and biochemical characterization of micro-organisms.

Lack (C. H.). **A simple hot box for microcultures.**—*J. gen. Microbiol.*, 7, 1–2, p. 144, 1 pl., 1952.

At the Institute of Orthopaedics, Royal National Orthopaedic Hospital, Stanmore, Middlesex, an apparatus for microscopical observation and photographing cultures kept at controlled temperatures for long periods was made by fixing 18 in. electrothermal heating tape inside a wooden microscope case containing the microscope, the draw tube of which protrudes through the top. Leads pass through a Sunvic thermostat outside the box, and two thermometers protected by metal shields pass through the sides. A glass water chamber for illumination without loss of heat is let into the back. Illumination is provided by an 8 V. Cooke lamp which slides in and out of the box and for photographic work a mercury vapour lamp fixed behind it. During long periods of observation a perspex front aids in maintaining a constant temperature.

Verona (O.) & Gambogi (P.). **Una ricerca sull' azione della citrinina prodotta da Penicillium citrinum Thom su funghi fitopatogeni.** [A study on the action of citrinin produced by *Penicillium citrinum* Thom on pathogenic fungi.]—*Phytopath. Z.*, 19, 4, pp. 423–430, 6 figs., 1 graph, 1952. [German and English summaries.]

At the Phytopathological Institute of the University of Pisa *Penicillium citrinum* appeared as an accidental contaminant of cultures of *Sclerotium rolfsii*, the growth of which was suppressed, presumably through the agency of citrinin [*R.A.M.*, 11, p. 119; 21, p. 344; 25, p. 175]. Of 16 phytopathogenic fungi tested for sensitivity to citrinin in bean agar cultures, only *S. rolfsii* and *Endothia parasitica* were inhibited at a dosage of 1,000 μgm. per ml.

Nickell (L. G.). **Stimulation of plant growth by antibiotics.**—*Proc. Soc. exp. Biol., N.Y.*, 80, 4, pp. 615–617, 1952.

Evidence for the stimulation of plant growth by antibiotics is presented from the Biochemical Research Laboratories, Chas. Pfizer & Co., Inc., Brooklyn, New York, on the basis of three types of experiments, one of which involved the culture of [clover big vein] virus tumour tissue from the roots of sorrel (*Rumex acetosa*) plants [*R.A.M.*, 30, pp. 215, 403]. The growth value (ratio of the final wet weight of the tissue to its initial wet weight) obtained by the addition to the medium of penicillin at 1 p.p.m. was 4 and for terramycin, streptomycin, thiolutin [ibid., 32, p. 154], and bacitracin [ibid., 31, p. 621], at 5 p.p.m., 7·2, 5·3, 6·3, and 10·9, respectively, as compared with 1·3 for the untreated control.

Williams (A. E.). **The preservation of textiles. The use of metallic naphthenates.**—*Indian Text. J.*, 62, 741, pp. 549–552, 576, 1952.

The author has collected information on the application of copper naphthenate to the mould-proofing of textiles [*R.A.M.*, 32, p. 205] at the United States Department of Agriculture, the Transvaal Chamber of Mines Research Laboratories, and the British Marine Biological Association.

Notes on mildew and micro-organisms in textiles.—*Text. Mfr, Manchr*, 78, 932, pp. 422–424, 1952.

This survey of the available information on the microbiological degradation of textiles, presented under the headings of causes, effects, protection, and testing, is based on 14 contributions to the literature.

Marshall (C. R.) & Walkley (V. T.). **Some aspects of microbiology applied to commercial Apple juice production. VI. The significance of changes in the relative incidence of spoilage organisms during processing.**—*Food Res.*, 17, 4, pp. 307–314, 1952.

Further studies at Seager, Evans & Co., Ltd., London, in this series [cf. *R.A.M.*, 31, p. 570] involved the assessment of the relative incidence of moulds at different stages of processing apples for juice production. In the silo the incidence (reckoned as a percentage of all the moulds present) of a group represented by four species of *Mucor*, *Zygorrhynchus moelleri*, and *Rhizopus nigricans* [*R. stolonifer*] was 5, in juice fresh from the press 6·1, in juice in storage tanks for 18 months 1, and in the pasteurized bottled product 0, the corresponding figures for a group of *Aspergillus* (nine species) being 23, 25, 42, and 42; for nine species of *Penicillium*, *Scopulariopsis brevicaulis*, and *Paecilomyces varioti* 61, 60, 31, and 58; and for *Fusarium* sp., *Alternaria tenuis*, *Cladosporium herbarum*, *Botrytis cinerea*, *Oospora lactis*, *O. candida*, and *Monilia sitophila* 11, 8·9, 26, and 0. Only a few species, therefore, tend to predominate during the later stages of processing. The most frequent fungi in the storage tanks after 18 months were *Aspergillus niger* (10 per cent.), *A. fumigatus* (26), *Penicillium expansum* (20), and *C. herbarum* (25).

The incidence of the yeasts relative to the moulds increased progressively throughout processing up to the time the juice was filtered immediately before storage, falling to nil in the bottled product, whereas the bacterial population declined steadily from the silo onwards.

Lüthi (H.) & Hochstrasser (R.). **Über zwei neue gegenwärtig häufiger auftretende Pilzinfektionen in der bäuerlichen Süssmosterei.** [On two new fungal infections of frequent occurrence at present in the rural sweet must industry.]—*Schweiz. Z. Obst- u. Weinb.*, 61, 16, pp. 301–307; 18, pp. 359–361, 5 figs., 1952.

Besides well-known mould contaminants of wine [*R.A.M.*, 30, p. 184], *Paecilomyces varioti* [cf. preceding abstract] and *Byssochlamys fulva* have become prevalent of late years in the Swiss rural sweet must industry, the former rarely and the latter never before recorded in this connexion. Both fungi proved to be extraordinarily thermostable, withstanding treatment for up to one hour at 80° C., 20 minutes at 85°, and two minutes at 90°. The sole guarantee of completely uncontaminated products consists in the hermetic sealing of the containers.

Melin (E.) & Nilsson (H.). **Transport of labelled nitrogen from an ammonium source to Pine seedlings through mycorrhizal mycelium.**—*Svensk bot. Tidskr.*, 46, 3–4, pp. 281–285, 1 fig., 1952.

Melin (E.) & Nilsson (H.). **Transfer of labelled nitrogen from glutamic acid to Pine seedlings through the mycelium of Boletus variegatus (Sw.) Fr.**—*Nature, Lond.*, 171, 4342, p. 134, 1953.

In a previous contribution (*Physiol. Plant*, 3, 1950) from the Institute of Physiological Botany, Uppsala, Sweden, the authors demonstrated the transport of labelled phosphorus from a phosphate solution to the tissues of pine seedlings [cf. *R.A.M.*, 32, p. 142] by the hyphae of the mycorrhizal fungus *Boletus variegatus*. The experiments reported in the first paper, using the same host and fungus species, revealed a similar aptitude in respect of the transport of nitrogen [loc. cit.] from an ammonium salt solution to the root tissues and thence throughout the plant. Mycorrhiza of other trees probably behave in the same way.

In the second paper the authors report a similar transference of nitrogen from glutamic and other amino acids.

Winter (A. G.). **Untersuchungen über die Verbreitung und Bedeutung der Mykorrhiza bei kultivierten Gramineen und einigen anderen landwirtschaftlichen**

Nutzpflanzen. (Vorläufige kurze Mitteilung.) [Studies on the distribution and importance of mycorrhiza in cultivated Gramineae and some other agricultural economic plants. (Preliminary brief note.)]—*Phytopath. Z.*, 17, 4, pp. 421–432, 12 figs., 1951. [Received 1952.]

Much of the information in this paper from the University of Bonn, Germany, on mycorrhizal development in natural and cultivated soils has already been noticed from another source [*R.A.M.*, 30, p. 283]. Infested roots manifest no symptom of disease, but when the tip extension zone and root hair region are permeated there is no development of root hairs, and this feature is associated with the poor development of plants heavily infested by mycorrhiza. In maize the base of the haulm is often heavily infested. No difference could be detected between mycorrhiza-free and -infested portions of oat roots in respect of intensity of infection by *Ophiobolus graminis*.

Sauthoff (W.). **Über Stoffwechselprodukte bei Botrytis cinerea Pers.** [On the metabolic products of *Botrytis cinerea* Pers.]—*Phytopath. Z.*, 19, 4, pp. 483–484, 1952.

Detached shoots of pea and *Helxine soleirolii*, to which a culture filtrate of *Botrytis cinerea*, isolated from orange, was applied by the vacuum infiltration method, developed sharply delimited necroses, while the controls absorbing comparable amounts of pure nutrient solution remained symptomless. The toxic effect [*R.A.M.*, 31, p. 253] of the filtrate generally reached a peak on the fifth day.

Culture filtrates active against *H. soleirolii* were tested by the methods of Blumer and Kundert [ibid., 31, p. 565] and Kobel [ibid., 32, p. 32] for their influence on *Ustilago zeae* [*U. maydis*]. Here again the maximum degree of toxicity was attained on the fifth day, followed by a sharp fall to zero on the seventh. The height of toxicity coincided with the maximum mycelial increment, the minimum pH (which fell from 5·5 to between 4 and 4·5 in four to five days), and the lowest surface tension of the culture filtrate.

Gäumann (E.). **Über Abwehrreaktionen bei Pflanzen.** [On defence reactions in plants.]—*Zbl. Bakt.*, Abt. 1 (*Orig.*), 158, pp. 205–217, 7 figs., 4 graphs, 1952.

Information is presented on the processes involved in the establishment of plant infections and the reactions thereby elicited in the host under the headings of the initial response, the diseased state, chemical anti-infectional defence reactions, chemical anti-toxic defence reactions, histogenic demarcation reactions, premunity, and immunity [cf. *R.A.M.*, 24, p. 465; 29, p. 371; 32, p. 151, *et passim*].

Gäumann (E.), Naef-Roth (Stephi), & Kobel (H.). **L'acide fusarique, une seconde toxine de flétrissement produite par Fusarium lycopersici Sacc.** [Fusarinic acid, a second wilt toxin produced by *Fusarium lycopersici* Sacc.].—*C.R. Acad. Sci., Paris*, 234, 2, pp. 173–174, 1952.

In addition to lycomarasmin [see next abstract], *Fusarium* [*bulbigenum* var.] *lycopersici* produces a second wilt inducing toxin fusarinic acid [loc. cit.], which is probably identical with 5-*n*-butylpicolinic acid. First discovered by Yabuta *et al.* in *F. heterosporum* [*F. oxsporum* f. 2] (*J. agric. chem. Soc. Japan*, 10, pp. 1059–1068, 1934), it has since been detected at the Federal Technical College, Zürich, Switzerland, in *F. vasinfectum* and *Gibberella fujikuroi*.

Cotton proved to be the most susceptible to fusarinic acid of the plants tested, its primary leaves being perceptibly damaged by a quantity equivalent to 25 mg. per kg. fresh plant weight. Tomato shoots were less sensitive, with a critical dose of 150 mg., rice, maize, and the primary leaves of haricot bean [*Phaseolus vulgaris*] even more resistant (250 mg.), while rye and peas were virtually unaffected, a concentration of 2,500 mg. being necessary to induce necrosis. Whereas the necroses

elicited by low dosages of lycomarasmin develop at the tip and margins of tomato leaflets, those provoked by fusarinic acid at comparable levels occur primarily in the interveinal tissues and also involve the stem, which is not affected by lycomarasmin. When the two toxins are applied simultaneously, each produces its own symptoms independently and there is no synergistic effect.

GÄUMANN (E.), NAEF-ROTH (ST[EPHI]), REUSSER (P.), & AMMANN (A.). **Über den Einfluss einiger Welketoxine und Antibiotica auf die osmotischen Eigenschaften pflanzlicher Zellen.** [On the influence of some wilt toxins and antibiotics on the osmotic properties of plant cells.]—*Phytopath. Z.*, 19, 2, pp. 160–220, 5 figs., 1 diag., 18 graphs, 1952.

Studies at the Federal Technical College, Zürich, Switzerland, revealed no correlation between the chemical composition of the wilt toxins recognized to date, namely, lycomarasmin [*R.A.M.*, 30, p. 548], fusarinic acid [see preceding and next abstracts], enniatin A [ibid., 29, p. 422], alternaric acid [ibid., 32, p. 140], and patulin [or expansin: loc. cit.; ibid., 32, p. 221], and the systematic position of the several pathogens producing them. There was also no connexion between the systematic position of the primary host of a given pathogen and the chemical composition of the fungus toxin.

The molecular weights of the wilt toxins are remarkably low and this is probably connected with the fact that the host cell walls would bar the passage of large molecules.

In comparative tests on tomato and red beet tissues, enniatin A was about equally toxic to both, whereas alternaric acid and streptomycin were toxic to tomato but not to beet. Streptomycin was not inactivated by beet sap and persisted in an active form in the tissue.

Compared with the bacterial toxins of human medicine, e.g., the diphtheria toxin, the wilt toxins are relatively avirulent; for the four well-known ones the average quantity of the toxic substance required to produce injuries of an intensity grade of 1·5 on tomato shoots was 12·6 mg. per kg. live weight. The wilt toxins and antibiotics investigated were differentiated into three groups on the basis of these studies, namely, (*a*) specific osmotic toxins, which impair the permeability of the protoplasts of tomato leaves at concentrations as low as 10^{-7} to 10^{-5} M, comprising fusarinic acid, enniatin A, patulin, penicillic acid [ibid., 27, p. 488], streptomycin, aureomycin [ibid., 31, p. 345], and dithane D-14; (*b*) moderately strong osmotic toxins, represented by the lycomarasmin-iron complex and alternaric acid, which disorganize the water relations of tomato plants at a range of 10^{-4} to 10^{-3} M, alternaric acid being also the most injurious of all the toxins to transpiration; and (*c*) weak osmotic toxins, namely, penicillin G [ibid., 29, p. 146], chloromycetin [chloramphenicol], and kojic acid [ibid., 30, p. 52], concentrations exceeding 10^{-3} M of which are necessary to impair the permeability of tomato leaf protoplasts.

GÄUMANN (E.), NAEF-ROTH (STEPHI), & KOBEL (H.). **Les synergismes chez les toxines de Fusarium lycopersici Sacc.** [Synergisms between the toxins of *Fusarium lycopersici* Sacc.]—*C.R. Acad. Sci., Paris*, 234, 3, pp. 276–278, 1952.

Mixed with succinic acid or oxyquinoline, fusarinic acid [see preceding abstracts] caused more severe damage to tomato stems than when applied to the plants in a pure state.

LANDOLT (E.). **Über Welkestoffbildung bei Fusarium culmorum (W. G. Sm.) Sacc.** [On the production of a wilt-inducing substance by *Fusarium culmorum* (W. G. Sm.) Sacc.]—*Phytopath. Z.*, 19, 1, pp. 126–128, 1 graph, 1952.

Filtrates of single isolates of *Fusarium culmorum* and its variety *cereale* from wheat [*R.A.M.*, 30, p. 313], cultured on Raulin's solution at the Federal Technical

Institute, Zürich, caused leaf wilting of 23 plant species, among which tomato and *Melilotus alba* were the most sensitive. Two substances, apparently not related to those previously isolated [cf. ibid., 16, p. 523], seem to be formed successively. The second does not affect *M. alba* or *Bacillus subtilis* (one of the 28 bacteria inhibited in bouillon cultures). On tomato this substance caused flaccidity mostly of young leaves and petioles, but no necrosis, in contrast to the first, which induced necrosis of the lamina.

At pH 4·5 the toxicity of the filtrate of a seven-day-old culture was not weakened by heating for a quarter of an hour, but at pH 10 it was inactivated by standing for half-an-hour. Standing for a longer period at room temperature also caused inactivation, whereas at 3° C. the filtrate retained its virulence for several months. It is partially soluble in ethyl alcohol, acetone, chloroform, ethyl acetate, and ether, but not in petrol.

Turel (F.). **Der Einfluss von Aneurin und Zink auf das Wachstum und die Toxinproduktion von Fusarium solani (Mart.) App. et Wr.** [The influence of aneurin and zinc on the growth of and toxin production by *Fusarium solani* (Mart.) App. & Wr.]—*Phytopath. Z.*, 19, 3, pp. 307–342, 15 graphs, 1952.

The optimum temperature for the growth of *Fusarium solani* in malt agar cultures at the Federal Technical Institute, Zürich, was 27° C. and the maximum 34°. Toxin production, measured by the sensitivity of *Bacterium mycoides* [cf. *R.A.M.*, 25, p. 270] in mixtures of dilute bouillon with the culture filtrate, was more copious at temperatures above 21° than under 18° both in Richards's and Raulin's solutions. On the other hand, toxicity was considerably stronger in cultures maintained for long periods at a low temperature.

The addition to cultures in Richards's solution plus 4 per cent. glucose at 18° of aneurin [vitamin B_1] at dosages exceeding 10γ per l. promoted growth during the initial phase (up to seven days) but retarded it in the later stages, when toxin production was also increased four to 13 times. At a concentration of 1γ per l. vitamin B_1 did not influence growth to the same extent as at 10γ, but was equally effective as a stimulant to toxin production. In cultures in Raulin's solution alone or Richards's plus zinc sulphate (50 mg. per l.) vitamin B_1 acted only on growth promotion during the initial phase; later, there was no check and also no promotion of toxin. Even when the addition of the vitamin to cultures in Richards's solution was delayed until the third to seventh day after inoculation, it still acted in the same way, depressing fungal growth and influencing toxin production. The growth substance content (especially vitamin B_1) of aqueous mycelial extracts of *F. solani* grown in the different media was determined at various stages by means of an unidentified *Phycomyces* sp.

Müller (E.) & Biedermann (W.). **Der Einfluss von Cu^{+2}-Ionen auf den Keimungsablauf von Alternaria tenuis.** [The influence of Cu^{+2} ions on the course of germination of *Alternaria tenuis*.]—*Phytopath. Z.*, 19, 3, pp. 343–350, 3 graphs, 1952. [English summary.]

Observations at hourly intervals on the course of germination of *Alternaria tenuis* spores treated with cupric ions [*R.A.M.*, 31, p. 342] liberated in cupric chloride solution showed that the process can be retarded by sublethal dosages, but after periods varying with the concentration recovery takes place and germination is resumed. Immersion of the spores in water before treatment reduced copper toxicity. Lethal copper doses can be inactivated at any time during spore treatment by the addition of the complex-forming trisodium ethylenediamine tetraacetate, the inhibiting effect of which increases in proportion to the duration of action of the copper on the spores. The toxicity of the cupric ions to the spores does

not increase beyond a concentration of pCu 3, at which level the surfaces are presumed to be saturated with cupric ions.

Démétriadès (S. D.). **Études sur la biologie du Sclerotinia sclerotiorum (Lib.) Massee. I. L'influence de la pression osmotique du milieu.** [Studies on the biology of *Sclerotinia sclerotiorum* (Lib.) Massee. I. The effect of the osmotic pressure of the medium.]—*Ann. Inst. phytopath. Benaki*, 5, 2, pp. 65–75, 3 graphs, 1951. [Received 1952.]

In studies at the Phytopathological Institute, Benaki, Greece, the optimum or maximum osmotic pressure for the growth of *Sclerotinia sclerotiorum* [*R.A.M.*, 31, p. 250; 32, p. 167] in a liquid medium (modified Richards's solution) varied according to whether it was regulated by glucose, saccharose, or sodium chloride. The optimum total yield in dry matter was obtained at 30 atmospheres for glucose and 20 for saccharose. The maxima tolerated by *S. sclerotiorum*, while showing measurable growth, were 90, 40, and 50 atmospheres for each material, respectively. The optima and maxima varied with the age of the culture.

Yusef (H. M.). **The requirements of some hymenomycetes for essential metabolites.**—*Bull. Torrey bot. Cl.*, 80, 1, pp. 43–64, 4 figs., 1953.

This investigation at the New York Botanic Garden and the Department of Botany, Columbia University, New York, was undertaken to define more clearly the nutritional requirements of 41 species or strains of *Polyporus* and *Fomes* included in an earlier survey [*R.A.M.*, 31, p. 30]. In general a basal agar medium supplemented by vitamins was employed; for *P. schweinitzii* casein hydrolysate was substituted for asparagine and the dextrose concentration reduced to 2 per cent. The fungi were arranged in five groups according to the amount of growth with the addition of pyrimidine. Group C, including *F. pini*, *F. roseus*, *P. schweinitzii*, *P. squamosus*, and *P. trabeus* [*Lenzites trabea*], grew markedly better, but only at first, on media containing both pyrimidine and thiazole than on those containing the former alone; group D, including *P. gilvus*, *P. tulipiferae*, and *P. cinnabarinus* [*Trametes cinnabarina*] grew only slightly better at first on media supplemented with both components; and group E, including *P. borealis*, grew as well with pyrimidine media as with both vitamins.

P. gilvus produced more dry weight in 26 days when supplemented with vitamins and casein hydrolysate than on 2 per cent. malt extract, while *P. borealis* and *P. schweinitzii* produced substantially more dry matter in the malt extract. The growth of *F. pini* in malt extract was more than four times and of *F. roseus* more than twice that in the supplemented medium; ammonium nitrate was not a satisfactory substitute for casein hydrolysate. The dry weight of strains 94095R and 86353 of *P. schweinitzii* grown on malt was nearly double that in the vitamin medium, 86353 showing less response to the vitamins alone or with casein hydrolysate, which was a better source of nitrogen than ammonium sulphate or asparagine. Growth in the basal medium was improved by the addition of oleic acid, the optimum being 0·25 mg. per ml. *P. borealis* only grew on the basal medium supplemented with the vitamin mixture. Even then growth was less than in 2 per cent. malt extract. Unsatisfactory growth by this fungus is due primarily to lack of thiamin, probably coupled with the presence of one or more of the constituents of the basal medium (probably dextrose) in too great a concentration.

Hotson (H. H.). **Studies on the physiology of the rust fungi.**—*Diss. Abstr.*, 12, 3, p. 246, 1952.

In studies at the University of Minnesota 57 detergents were tested with a view to their incorporation in a chemical spray for suppressing rust development in

culture. Tween-20 (polyoxyethylene sorbitan monolaurate) was neither phyto- nor fungitoxic at 3 per cent. by volume. At 1 per cent. it penetrated leaves well and was adopted as a standard spray ingredient.

Seven-day-old wheat seedlings of the varieties Little Club, Spelmar, and Khapli were inoculated with race 56 of *Puccinia graminis tritici* and sprayed three days later with the test chemical in 1 per cent. tween-20. Infection types were determined fourteen days after inoculation. Sulphadiazine [*R.A.M.*, 30, p. 220] at 300 p.p.m. at about 14 lb. per acre was most effective, but sulphapyrizine, sulphapyridine, sulphamerizine, and gantrisin (3, 4, dimethyl-5-sulphanilamide-isoazole) at the same concentration also suppressed rust development. Picric acid [see above, p. 243], 2, 5 dinitro benzoic acid, 2,4,6-trinitro benzoic acid, and saccharine were also inhibitory but the margin between phytotoxicity and rust inhibition was so narrow (200 to 300 p.p.m.) that they are considered unsuitable as therapeutants. The addition of *p*-amino benzoic [loc. cit.] and folic acids resulted in almost complete recovery of the rust, from which it may be concluded that they are vitamins concerned in the wheat stem rust metabolism.

An attempt was made to produce a balanced system between a number of rusts and their hosts by employing Gautheret's tissue culture technique, but callus galls of *Gymnosporangium juniperi-virginianae* on juniper [*Juniperus virginiana*: cf. ibid., 31, p. 508] were the only ones to develop.

Arenz (B.). **Der Einfluss verschiedener Faktoren auf die Resistenz der Kartoffel gegen die Pfirsichblattlaus. Weitere Ergebnisse über die Resistenz der Kartoffel gegen die Pfirsichblattlaus.** [The influence of various factors on the resistance of the Potato to the Peach aphid. Further data concerning the resistance of the Potato to the Peach aphid.]—*Z. PflBau*, 2 (46), 2, pp. 49–62, 63–67, 4 graphs, 1951.

Observations under uniform conditions on 17 potato varieties at the Bavarian Plant Breeding Institute, Weihenstephan, in 1950–1 showed that the viruses of leaf roll and [unspecified] streak induce constitutional changes which stimulate the peach aphid [*Myzus persicae*] to increased colonization and reproduction [cf. *R.A.M.*, 31, p. 624; 32, p. 96]. In the case of streak this concentration of the vector carries the risk of rapid infestation, since the diseased plants die off prematurely, thereby forcing the extensive aphid populations to emigrate to the healthy portions of the stand.

On healthy Ackersegen aphid reproduction was scanty and mortality high, whereas on virus-diseased plants and on detached leaves of healthy ones the development of the vectors was not impeded. It is concluded from these results that the resistance of Ackersegen to *M. persicae* is not due to the presence in the plants of any protective substance but to their physiological status, which hinders the assimilation of nutriment by the aphids.

Köhler (E.). **Beiträge zur Kenntnis des A-Virus der Kartoffel.** [Contributions to the study of the A-virus of the Potato.]—*Phytopath. Z.*, 19, 3, pp. 295–306, 2 figs., 1952.

Further studies are reported from the Virus Research Station, Celle, Germany, on potato virus A [*R.A.M.*, 16, p. 702; 28, p. 78; 31, p. 138], inoculation with which on *Solanum demissum*, either by rubbing or grafting, incited the development of local necroses on the foliage. Negative results were usually given by reinoculation experiments on the same host with sap from infected leaves, pointing to the rapid inactivation of the virus therein, in contrast to a relatively high content in the petioles and stems as indicated by the larger number of lesions obtained with sap from these sources. The existence of at least two strains of the virus must be

inferred from the outcome of reinoculation experiments on *S. demissum* leaves with the P 716/17 strain of the virus, originally isolated from the Erdgold potato variety in 1936, and Sab 48, recently obtained from Sabina, the average numbers of single lesions (per ten leaves) produced by which were 52·2 and 3·9, respectively. On the other hand, the Sabina strain proved capable on occasion of inducing severe systemic symptoms in *S. demissum*, involving necrosis of entire shoots. These extreme contrasts in symptomatology are interpreted as a sign of lability both in the factors governing the inactivation of the virus in the vascular system of the host and in the constitution of the virus itself.

Köhler (E.). **Die Bukettkrankheit, eine Viruskrankheit der Kartoffel.** [The 'bouquet' disease, a virus disease of the Potato.]—*Phytopath. Z.*, 19, 3, pp. 284–294, 16 figs., 1952.

This is an amplified account of the author's studies at the Virus Research Institute, Celle, Germany, on the ring spot or 'bouquet' disease of potatoes which has been causing severe damage and reducing crop yields in Lower Saxony during the post-war years [*R.A.M.*, 31, p. 138]. Information is presented, *inter alia*, on the symptoms induced on various hosts [loc. cit.], including bean (*Phaseolus vulgaris*), cucumber, *Calendula* sp., *Solanum polycanthos*, *S. luteum*, *Datura gigantea*, and *Nicandra physaloides*, by inoculation with two strains of the virus, designated N and C, the former isolated from a typically diseased field plant of the Bona variety and the latter (the more virulent of the two) from Samsun tobacco inoculated with sap from a greenhouse 'eye-cutting' of Condor tomato.

The author considers that the 'bouquet' virus is most closely related to the strain isolated by him from yellow-spotted potato leaves [ibid., 20, p. 422] and appears to be a virulent mutation from it. It differs from tobacco ring spot virus and the related strains causing tomato ring spot in its thermal death point (between 60° and 65° [C.]). Also, the unpublished results of Völk show that attempts to transmit the 'bouquet' virus by thrips have proved negative, though it is readily transmissible by aphids. The name proposed for the 'bouquet' virus is *Solanum-virus deformans*.

Hutton (E. M.) & Peak (J. W.). **Definition of Potato virus Y strains by some solanaceous species.**—*Aust. J. agric. Res.*, 3, 1, pp. 1–6, 1 pl., 1952.

At the Division of Plant Industry, Canberra, *Lycium halimifolium*, *L. rhombifolium*, *Physalis floridana*, and two varieties of sweet (chilli) pepper (*Capsicum annum*) were used to distinguish between four strains of potato virus Y [*R.A.M.*, 28, p. 237; 30, p. 578], namely, R and 18·2 from Rothamsted Experimental Station, Victorian Y originally infecting the Carman potato variety grown in the Ballarat district of Victoria, and virus C obtained from Dr. J. G. Bald [ibid., 25, p. 42]. Inoculum was prepared from infected tobacco tisssue macerated with phosphate buffer at pH 7 in the constant proportion of 1:20 (w/v).

On *L. rhombifolium* and *L. halimifolium* inoculated with strain R and *L. halimifolium* with Victorian Y lesions appeared in five days and most of the inoculated leaves abscissed in seven. Strains 18·2 and C produced few or no lesions.

The best differentiation was given by the systemic symptoms produced in *P. floridana*, which were well developed 21 days after inoculation. R caused severe systemic mottling, leaf abscission, and stunting; Victorian Y light but pronounced systemic mottle; and C as for R but with more severe stunting. Transfers to *Nicotiana glutinosa* and the potato seedling 11–84 indicated a slow and limited development of strain 18·2 in the leaves of *P. floridana* which, however, remained symptomless.

Strains R, 18·2, and C produced no symptoms on the sweet pepper variety World Beater or on an unnamed variety from New Jersey; transfer of sap from

inoculated leaves to *N. glutinosa* and potato seedling 11–84 showed that World Beater was immune from all three strains and the unnamed variety susceptible only to R. When *N. glutinosa* was inoculated concurrently with a virulent strain of potato virus X [ibid., 29, p. 114] and the virulent R strain of virus Y growth of the plants ceased; strain 18·2 of Y with the same X strain caused little depression of growth.

PETERS (E. H.). **The certification of Potatoes for seed in Canada.**—*Amer. Potato J.*, 29, 4, pp. 85–88, 1952.

The author briefly outlines the procedure adopted in Canada for the inspection of seed potato crops [cf. *R.A.M.*, 29, p. 376; 31, pp. 502, 509; 32, p. 95] and gives personal observations on diseases affecting important varieties in parts of Ontario and Quebec. In 1951, 87·4 per cent. of the potato fields entered in Canada and 87·5 per cent. of the acreage were passed for certification; a high percentage of the passed fields had 'clear' readings.

VASUDEVA (R. S.) & AZAD (R. N.). **Investigations on Potato diseases and production of disease-free seed Potatoes in India.**—*Emp. J. exp. Agric.*, 20, 8, pp. 293–300, 1952.

Most of this information on the position and distribution of potato diseases, particularly viruses, in India during the last ten years has already been noticed from other sources [*R.A.M.*, 16, p. 231; 26, p. 75; 27, p. 578; 30, p. 510; 32, p. 145]. Potato leaf roll virus [ibid., 30, p. 485] and rugose mosaic [potato virus Y: ibid., 28, p. 115] caused the highest yield reductions (72 to 92 per cent.), followed by potato mild mosaic [potato virus A: loc. cit.] (52 per cent.), which is the most widespread potato virus in India.

FLIK (H. M.) & KERSSEN (M. C.). **Beknopt verslag van een proef ter bestrijding van de Aardappelziekte met behulp van vernevelmachine en vliegtuig.** [Abridged report of an experiment in the control of Potato blight with the aid of a mist blower machine and aircraft.]—*Maandbl. LandbVoorlDienst*, 9, 5, pp. 177–183, 2 figs., 1952.

An experiment was organized by the Phytopathological Research Institute, Wageningen, Holland, to determine the practicability of potato blight (*Phytophthora infestans*) control by spraying with a motor mist blower (manufactured by Steenbergen) and from a Stinson Vigilant PH-PBD aeroplane [cf. *R.A.M.*, 32, p. 138]. The fungicides tested, copper oxychloride, copper oxide, and zineb, were applied on 20th June, 5th, 16th, and 30th July, and 14th August, the first at dosages of $7\frac{1}{2}$, 9, 9, 11, and 11 kg. per ha. on the respective dates, the second at 4, 5, 5, 6, and 6, and the third at 3, 4, 4, 5, and 5. The fungicides were used at the rate of 50 l. liquid per ha. for the mist blower and 47 l. for the aeroplane, as compared with 800 to 1,000 l. for normal spraying. The experimental field, 200 m. in length, was planted with the susceptible Bintje variety.

The distribution of the sprays on the leaves was recorded by Blodgett and Mader's method [ibid., 13, p. 587]. The dry weights of the residues of copper oxychloride, zineb, and copper oxide deposited by the mist blower averaged 79·5, 56·8 and 55·4 mg., respectively, and by the aeroplane 64, 28·8, and 48·8 mg.

At the final inspection on 17th August, the state of the foliage, using a scale in which 10 represents freedom from infection and 1 complete necrosis, was adjudged as follows: copper oxide, zineb, and copper oxychloride, sprayed from the aeroplane, 7·5, 4·5, and 5·7, respectively; the same treated with the mist blower, 7·6, 6·6, and 6; untreated, 1·6; and buffer strips, 6·9.

PETTINARI (CARLA). **Azione patogena della Clonostachys araucariae Corda var. rosea Preuss su tuberi di Solanum tuberosum.** [The pathogenic action of *Clonostachys araucariae* Corda var. *rosea* Preuss on tubers of *Solanum tuberosum*.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 85–92, 9 figs., 1951. [English summary.]

This paper on the disease in Italy has been noticed from another source [*R.A.M.*, 28, p. 640].

AYCOCK (R.) & HUGHES (M. B.). **Sweet Potato clones whose roots serve as symptomless carriers of internal cork virus.**—*Phytopathology*, 42, 8, pp. 428–430, 1 fig., 1952.

At the Edisto Experiment Station, Blackville, South Carolina, no symptoms of internal cork virus [*R.A.M.*, 32, p. 33] were observed on the roots of two sweet potato clones (3–6 and 32–149) with conspicuous foliar ring spot. Infection was, however, transmitted from these clones to healthy Porto Rico plants by means of core and cleft grafts, thereby demonstrating the presence of the virus in the roots without external symptoms. The close relationship of the clones suggests the heritability of this character.

HASHIOKA (Y.). **Simplification of the Rice seed disinfection and application of arasan.**—*Plant Prot.* (*Japan*), 4, pp. 173–175, 1952. [Japanese.]

Rice seed disinfection against blast [*Piricularia oryzae*: see next abstract] and brown spot [*Ophiobolus miyabeanus*: *R.A.M.*, 31, p. 575] by a five-minute dip in uspulun (1 in 1,000) and then covering with mats moistened with the same solution for six hours to prevent drying is applicable to the lowland crop. For colder regions immersion in uspulun at the same strength at 40° C. for five minutes is recommended. Upland rice seed may also be treated with ceresan.

OTANI (Y.). **Studies on the relation between the principal components of Rice plant and its susceptibility to the blast disease. III.**—*Ann. phytopath. Soc. Japan*, 16, 3–4, pp. 97–102, 1952. [Japanese.]

Inoculation tests and chemical analyses of water-cultured rice plants supplied with varying amounts of nitrogen confirmed the susceptibility to blast [*Piricularia oryzae*: see preceding abstract] of those provided with an excess of soluble nitrogen [*R.A.M.*, 32, p. 210]. After a top-dressing the plants are severely infected within two days in association with an increase in α-amino and amide nitrogen [ibid., 32, p. 210]. There was no correlation between susceptibility to blast and the sugar content of the plants.

WAITE (B. H.) & DUNLAP (V. C.). **South American leaf blight on Hevea Rubber in Honduras.**—*Plant Dis. Reptr*, 36, 9, p. 368, 1952. [Multilithed.]

This is the first record of South American leaf blight (*Dothidella ulei*) [C.M.I. map No. 27] on *Hevea* rubber in the Republic of Honduras. The disease recently appeared in Guatemala and now occurs throughout the commercial rubber-growing areas of Central America.

SCHWEIZER (J.). **Het doden van oude Hevea-aanplantingen met natrium-arseniet.** [The killing of old *Hevea* plantings with sodium arsenite.]—*Bergcultures*, 21, 17, pp. 340–343, 345, 347–349, 12 figs., 1952. [English summary.]

A report is given on the author's visit to a Malayan *Hevea* rubber estate in February, 1951, to investigate the results of poisoning old stands with sodium arsenite [*R.A.M.*, 30, p. 387; 31, p. 629] in preparation for replanting with improved material. The poisoned trees had almost entirely disappeared within two or three years from the replanted areas, their roots decomposing, according to the manager's

statement, within 6 to 18 months. The cost of the treatment, using liquid sodium arsenite, is estimated at a maximum of 25 cents per tree, inclusive of labour. The average density of the poisoned trees was 60 to 70 per acre. [Unspecified] root rots were prevalent in the old stands, but there was no evidence of loss from this source in the new plantings. This freedom from root disease is attributed to the antagonistic action of saprophytic fungi in the soil.

RADEMACHER (B.). **Mangan und Manganmangel in Böden und Pflanzen.** [Manganese and manganese deficiency in soils and plants.]—*Phosphorsäure*, 12, 4, pp. 193–208, 5 figs., 1952.

Information, based on the author's investigations in Germany and 33 contributions to the literature, is presented on manganese deficiency in soils and plants and its control by soil amendments, including basic slag, Röchling phosphate, and foundry lime, spraying with manganese sulphate, or seed treatment, e.g., with dynamal, containing boron and copper besides manganese.

SANFORD (G. B.). **Persistence of Rhizoctonia solani Kühn in soil.**—*Canad. J. Bot.*, 30, 5, pp. 652–664, 1952.

The effect of the presence of various 21-day-old host and non-host plants, soil amendments, and *Trichoderma lignorum* [*T. viride*: *R.A.M.*, 31, p. 271] on the persistence of a heavy artificial infestation (one part inoculum to nine parts soil) of *Rhizoctonia* [*Corticium*] *solani* was studied under controlled conditions at the Dominion Laboratory of Plant Pathology, Edmonton, Alberta, using natural, virgin black loam at optimum moisture content, held at 61° F., in further experiments in this series [ibid., 27, p. 254]. Persistence was assessed from disease ratings, root infestation, and examination of buried microscope slides, the first method being the most satisfactory.

When maize meal was added to the soil, the growth of *C. solani* was practically suppressed by *T. viride* for several days. In the presence of living potato plants *C. solani* persisted as well in natural, untreated soil as with the addition of maize meal, sodium nitrate, or calcium hydroxide. The fungus disappeared from the soil within 120 days when associated with wheat, oats, barley, or maize replanted every 21 days, but persisted for 170 days or longer in soils planted with potatoes, beans, or peas. In the absence of potatoes a heavy soil infestation in late autumn practically disappeared by the following June.

It appears, therefore, that *C. solani* depends entirely on parasitic nutrition for its persistence in the soil. Hyphae commonly inhabited the living roots of host and non-host plants, but there was no apparent nutritional relationship.

SALMON (E. S.). **'Bramling Cross' a new Hop resistant to Verticillium-wilt.**—*Pamphl. Wye Coll., Kent*, 4 pp., 2 figs., May, 1951. [Received February, 1953.]

The Bramling Cross hop variety (OT48), a hybrid between the English Bramling [*R.A.M.*, 28, p. 142] and the Canadian Seedling Male Hop [ibid., 27, p. 296], has proved to be moderately resistant to *Verticillium albo-atrum* [ibid., 31, p. 85 and next abstract]. Moreover, during a 20-year period of observation at Wye College it has shown no undue susceptibility to *Pseudoperonospora humuli* [ibid., 28, p. 594] and has remained free from *Sphaerotheca humuli* [ibid., 28, p. 241 and next abstract]. It harbours the hop mosaic virus [loc. cit.] without any external symptoms and should, therefore, not be planted near susceptible varieties of the Golding type.

SALMON (E. S.). **Norton Court Golding, a new Hop.**—*Pamphl. Wye Coll., Kent*, April, 1952. [Abs. in *J. Inst. Brew.*, N.S., 58, 4, p. 281, 1952.]

Norton Court Golding, the name now applied to hop seedling WtG19, a cross between Canterbury Golding and OB21, derived from Brewer's Gold, is a carrier of

hop mosaic virus [see preceding and next abstracts] but is itself unaffected; is moderately susceptible to downy mildew [*Pseudoperonospora humuli*: loc. cit.] and completely so to *Verticillium* [*albo-atrum*: see preceding abstract], and apparently free from mould [*Sphaerotheca humuli*: loc. cit.].

PAINE (J.) & LEGG (J. T.). **Transmission of Hop mosaic by Phorodon humuli (Schrank).**—*Nature, Lond.*, 171, 4345, pp. 263–264, 1953.

At East Malling Research Station, Kent, none of 3,520 summer wingless *Phorodon humuli* transmitted hop mosaic virus [*R.A.M.*, 31, pp. 143, 350, and preceding abstract] from eight different sources to 128 indicator plants in 1948. Monthly collections of other possible insect vectors in five gardens in which mosaic was known to be spreading in two successive years yielded only six species which occurred in both years. Of 90 Bramling test plants, each receiving one or more of these species, only the four receiving the spring winged form of *P. humuli* developed mosaic within a year.

Ten plants of susceptible Petham Golding were placed in a garden of the carrier variety Brewers Gold every month from March to August. Two of those exposed in June and one exposed in July later developed mosaic.

In 1951 ten Petham Golding hops were infested with winged *P. humuli* collected from hedgerow *Prunus* spp., some of which were first fed on mosaic-infested hops for one hour for 30 days. Nine of the test plants developed a line pattern symptom later the same year; early in 1952 six of these developed vein-banding and downward leaf-curling for a short period and then apparently recovered. Since then four plants have developed mosaic symptoms including the one that did not show line pattern in 1951. The relationship between viruses occurring in *Prunus* spp. and those found in the hop is being investigated.

BERNAUX (P.). **Deux maladies cryptogamiques intéressantes.** [Two interesting cryptogamic diseases.]—*Feuill. Nat.*, N.S., 6, 7–8, p. 67, 1951.

Notes are given on safflower rust (*Puccinia carthami*) [*R.A.M.*, 27, pp. 383, 541], which was very severe in the spring of 1951 in the south of France, killing the roots and eventually whole plants at Montpellier.

NUTMAN (F. J.) & ROBERTS (F[LORENCE] M.). **Sudden-death disease of the Clove tree, Eugenia aromatica.**—*Nature, Lond.*, 171, 4342, pp. 128–129, 1953.

Most of this information concerning the part played by *Valsa* sp. in sudden death of cloves in the Zanzibar Protectorate has already been noticed from another source [*R.A.M.*, 32, p. 65]. Field experiments in which heavy spore suspensions were applied over a period of several months to uninjured roots of mature trees demonstrated that the absorbing roots are attacked by the fungus, which later invades the fibrous root system, the cambial region, and finally other tissues.

ABBOTT (E. V.). **Sclerospora disease of Sugarcane identified in Louisiana.**—*Sug. Bull., N. Orleans*, 30, 23, pp. 390–391, 399–400, 1 fig., 1952.

The sugar-cane disease caused by *Sclerospora* [*?sacchari*] has been identified in Louisiana, mostly on the C.P. 44/101 variety in low-lying, poorly drained soils. So far its distribution appears to be limited and incidence is low. This is stated to be the first record of the disease outside Queensland and Peru (where it was detected not long ago) [but see C.M.I. map No. 21].

FUJIOKA (Y.). **List of crop diseases in Japan.**—*Prelim. Study nat. Resources Div., G.H.Q. Supreme Commander Allied Powers, Tokyo*, 73, 2 vols., 212 pp., 1952. [Multilithed.]

In the first of these two volumes a list is given, arranged aphabetically under the

common English names of the hosts (followed by the Latin name), of 1,974 diseases of crop plants found in Japan [cf. *R.A.M.*, 31, p. 458]. The spelling of each Japanese name is given according to the Hepburn system of romaji, also the scientific name of the causal organism, the English name of the disease, and the geographical distribution (Japan, and according to continents). The second volume consists of cross-indexes of English, scientific, and Japanese names of the diseases and English and scientific names of the hosts. There is a bibliography of 50 titles.

Bremer (H.), Karel (G.), Biyikoğlu (K.), Göksel (N.), & Petrak (F.). **Türkiyenin parazit mantarları üzerinde incelemeler. IV. Schizomycetes, Oomycetes, Ascomycetes II. V. Basidiomycetes II. VI. Fungi Imperfecti.** [Contributions to the knowledge of the parasitic fungi of Turkey. IV. Schizomycetes, Oomycetes, Ascomycetes II. V. Basidiomycetes II. VI. Fungi Imperfecti.]—*Rev. Fac. Sci. Univ. Istanbul*, Sér. B, 17, 2, pp. 145–160, 161–181; 3, pp. 259–276, 14 figs., 1952. [German, with English summaries.]

Among the records in these further instalments of an annotated list of Turkish parasitic fungi in course of publication [*R.A.M.*, 27, p. 349], may be mentioned *Claviceps paspali* on *Paspalum distichum* [C.M.I. map No. 90], *Guignardia bidwellii* on vine [ibid., No. 81], *Apiognomonia veneta* [*Gnomonia platani*] on *Platanus orientalis*, and *Graphiola phoenicis* on date palm, all new for the Near East.

Severe damage was inflicted on melon and potato crops by *Dothiorella phaseoli* (Maubl.) Petr., syn. *Macrophomina phaseolina* (Tassi) G. Goid. [*M. phaseoli*: *R.A.M.*, 27, p. 551] in the summer of 1948. The average diameter of the sclerotia was 100 μ, corresponding to Haigh's type C [ibid., 9, p. 685]; they were first observed on wilted bean [*Phaseolus vulgaris*] stems. In replicated field experiments the root rot was most prevalent on eggplant and chilli crops subjected to frequent moderate irrigation. External symptoms became apparent only during the height of the summer, when temperatures of over 50° C. in the upper soil layers are not uncommon. The fungus, accompanied by *Fusarium* spp., *Rhizoctonia*, and other organisms, was isolated from the roots of both healthy and diseased chilli and eggplant, but inoculation experiments with pure cultures on plants in pots gave almost uniformly negative results.

Greene (H. C.). **Notes on Wisconsin parasitic fungi. XVI.**—*Amer. Midl. Nat.*, 48, 3, pp. 741–757, 1952.

Included in this further critically annotated report on Wisconsin parasitic fungi [*R.A.M.*, 30, p. 345] and additional hosts are six new species in addition to *Gloeosporium pentstemonicola* n.sp., which produces broadly fusoid to suborbicular, pale brown spots with narrow, purple margins, approximately 0·5 to 1 cm. in diameter on the over-wintered but still green, lower leaves of *Pentstemon hirsutus*. The hyaline, subfusoid to lunate conidia measure 11 to 16 by 3·5 to 4·5 μ. Other records are *Rosenscheldia heliopsidis* on leaves of *Helianthus rigidus* [*H. scaberrimus*], *Phoma* sp. on *Taphrina mirabilis* on twigs of cultivated *Prunus*, *Septoria rudbeckii* on ray flowers (only) of *Rudbeckia hirta*, and on rays and leaves of *R. subtomentosa*, and *Chrysomyxa ledi* [ibid., 31, p. 147] on *Picea mariana*. *Taxus canadensis* is not included as a host for any parasites in the Wisconsin lists, though the living foliage is commonly blighted by a fungus considered to be probably *Sphaerulina taxicola*.

Savile (D. B. O.). **A study of the species of Cintractia on Carex, Kobresia, and Scirpus in North America.**—*Canad. J. Bot.*, 30, 4, pp. 410–435, 6 figs., 1952.

A taxonomic study is made of *Cintractia* spp. [cf. *R.A.M.*, 30, p. 584] on nearly 100 hosts belonging to *Carex*, *Kobresia*, and *Scirpus*, mainly in Canada, the northern United States, and southern Alaska. Eighteen species and varieties are recognized

including one new species and four new varieties; two new combinations are made. The biology and phylogeny of the group are discussed and a taxonomic key is provided for identification.

Săvulescu (T.). **Speciile de Puccinia parazite pe Cyperacee diu R.P.R.** [Species of *Puccinia* parasitic on Cyperaceae in the R.P.R.]—Reprinted from *Bul. sti. Acad. Repub. rom.*, 3, 1, 24 pp., 1951. [Russian and French summaries.]

This further study on Rumanian rusts [*R.A.M.*, 27, p. 448] includes 15 species of *Puccinia* parasitic on Cyperaceae with a description, synonymy, distribution in Rumania, host range, and bibliography for each species, and a dichotomous key for their determination. The work will form part of the monograph on the Uredinales [loc. cit.] now in preparation. It includes *P. pringsheimiana* [C.M.I. map No. 209] on gooseberry and red and golden currant and *P. opizii* [cf. *R.A.M.*, 9, p. 86; 31, p. 588] on cultivated and wild lettuce.

Pesante (A.). **Nuove segnalazioni di Septobasidium.** [New records of *Septobasidium.*]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 655–659, 1 col. pl., 3 figs., 1952. [English summary.]

Following his report of *Septobasidium mariani* on *Corylus avellana* and pedunculate oak near Turin, Italy (*Nuovo G. bot. ital.*, 56, p. 241, 1949), the author observed in February, 1950, the same fungus at Front Canavese on the same two hosts, hornbeam, and *Crataegus oxyacantha* [*C. oxyacanthoides*]. In March, 1950, it was present on wilting apple branches from Castellamonte, near Ivrea. All three localities are low-lying and damp.

Another species, apparently very close to *S. alni* [cf. *R.A.M.*, 14, p. 398], was found on *C. avellana* in January, 1950, near Lake d'Orta, and in October, 1951, at Dogliani (Cuneo).

Cain (R. F.). **Studies of Fungi Imperfecti. I. Phialophora.**—*Canad. J. Bot.*, 30, 3, pp. 338–343, 1 fig., 1952.

Some general notes are given on the structure and occurrence of phialides and phialospores and their relationship to spermatia. Because of all the gradations existing in the shape of the phialide and the extent of development of the apical collar, the genus *Phialophora* [cf. *R.A.M.*, 17, p. 178; 24, p. 195] is not sharply delimited, but includes many transitional species merging into various other genera of the Fungi Imperfecti. *P. radicicola* n.sp. [see above, p. 249], found on maize roots in Ontario in 1950, produces in culture numerous subglobose, black sclerotia about 1 mm. in diameter; the phialophores are decumbent, smooth, septate, 2 to 3 mm. long and 3 to 5 μ in diameter, and not constricted at the septa; the phialides, 10 to 23 by 3 to 4 μ, are hyaline or very light brown, one to three in a group, somewhat diverging, usually with a septum at the base and a fairly conspicuous, thin, transparent, flaring collar at the mouth, differing in appearance from the wall of the phialide, often disappearing in water, and not in contact with the emerging spore; the phialospores, accumulating to form large, viscid masses up to 150 μ in diameter, are hyaline, 5 to 9 by 0·7 to 1·5 μ, broadest near the base, gradually tapered toward the rounded apex, and curved in a semicircle, shorter phialospores being broader and less curved.

Groves (J. W.). **The genus Tympanis.**—*Canad. J. Bot.*, 30, 5, pp. 571–651, 3 pl., 4 figs., 1952.

A taxonomic study is made of 36 species and one variety of *Tympanis* [*R.A.M.*, 28, p. 489] with reference to history, morphology, conidial relations, parasitism, and distribution. The 16 species described as new, all weakly pathogenic, are *T.*

pseudotsugae and *T. hansbroughiana* on *Pseudotsuga taxifolia*, *T. piceae* on *Picea abies* and *P. glauca*, *T. tsugae* on *Tsuga canadensis*, *Tympanis abietina* on *Abies* spp., *T. piceina* on *Picea* spp., *T. prunicola* on *Prunus* spp., *T. amelanchieris* on *Amelanchier* spp., *T. magnoliae* on *Magnolia* sp., *T. rhoina* on *Rhus typhina*, *T. diospyri* on persimmon, *T. hydrangeae* on *Hydrangea* sp., *T. forsythiae* on *Forsythia* sp., *T. salicina* on *Salix* spp., *T. sorbi* on *Sorbus americana*, and *T. malicola* on apple. There is a key for species identification and a generic host index. In a section on doubtful and excluded species an attempt is made to account for all the *Tympanis* names in the literature.

Shaw (C. G.) & Yerkes (W. D.). **Additions to the downy mildews (Peronosporaceae) of the Pacific Northwest.**—*Northw. Sci.*, 26, 1, pp. 19–21, 1952.

The additional records of Peronosporaceae in the Pacific Northwest listed in this further contribution [*R.A.M.*, 31, p. 89] raise the number of species in the area (comprising Alaska, Alberta, British Columbia, Idaho, Montana, Oregon, and Washington) to 53 on 159 hosts.

Dennis (R. W. G.). **Biological races and their taxonomic treatment by mycologists.** —*Proc. Linn. Soc. Lond.*, 163, 1, pp. 47–53, 1952.

In this joint discussion (Linnean Society of London and Systematics Association) on the taxonomic treatment of biologic races the author draws attention, with reference to specific examples, to the present rather anomalous procedure in the taxonomic treatment of the Uredinales, namely, that two morphologically identical rusts having different hosts in both the aecidial and uredo-teleuto stages or in the aecidial stage only are regarded as distinct species, but if they differ only in uredo-teleuto host they are biological races or forma speciales of a single species. This arbitrary solution to the nomenclature problem has served for a number of years but is now breaking down, and may have to be abandoned entirely, as a result of more detailed experimental work. Thus, morphologically indistinguishable forms given specific rank because they have different aecidial hosts may have to be merged.

The position in the Ustilaginales, though not complicated by heteroecism, must follow the same plan, and the author supports recent work [*R.A.M.*, 30, pp. 247, 432], which regards morphologically similar forms as belonging to the same species. Sympathy is expressed, however, with the plant pathologist who requires different names for parasites with different parasitic propensities.

The accepted grouping of the powdery mildews (Erysiphaceae) and downy mildews (Peronosporaceae) has been on a morphological basis, with acknowledgement of wide host ranges for some species. It is suggested that these modern trends should be extended to the Fungi Imperfecti, particularly to those groups of little or no economic importance, distinguished at present only on host grounds.

Kobayasi (Y.). **On the genus Favolaschia and Campanella from Japan.**—*J. Hattori bot. Lab.*, 8, pp. 1–4, 3 figs., 1952.

This annotated list of four species of *Favolaschia* and one of *Campanella* occurring in Japan includes the new species *F. nipponica*, *F. phyllostachydis*, and *F. fujisanensis*, all occurring on living and dead bamboo culms.

Santesson (R.). **Foliicolous lichens I. A revision of the taxonomy of the obligately foliicolous, lichenized fungi.**—*Symb. bot. upsaliens.*, 12, 1, 590 pp., 1 pl., 92 figs., 1952. 40 Kr.

This monumental work is the result of the study of many hundreds of specimens of lichens restricted to living leaves, mostly from tropical regions. The author

recognizes 236 species in 38 genera. Since it is often difficult to decide whether a foliicolous organism is a fungus or a lichen, mycologists in the tropics are certain to find some of these lichens and, temporarily at least, to consider them fungi and possibly parasites.

The taxonomic account is preceded by some 50 pages giving a summary of the nature of these lichens and a list of names of organisms described as foliicolous fungi but which were lichens or, as the author calls them, lichenized fungi. The book ends with a list of literature and an index.

HAINSWORTH (E.). **Tea pests and diseases and their control (with special reference to North East India).**—xi+130 pp., 32 pl., Cambridge, W. Heffer & Sons, Ltd., 1952. 18*s*.

This useful handbook is intended as a practical guide to the identification and control of pests and diseases affecting tea [*R.A.M.*, 30, p. 126], particularly in north-east India [ibid., 32, p. 150]. Throughout the book unpractical control methods are rejected in favour of plant sanitation.

Chapter I (pp. 1–5) deals with the principles of plant protection; chapter III (pp. 11–16) with diseases of the tea nursery; V, VI, and VII with diseases of the root (pp. 20–39), stem (pp. 40–58), and leaves and green shoots (pp. 59–71), respectively; XI (pp. 105–107) with diseases and pests of flowers and seeds; and XIII (pp. 112–119) with plant protection equipment. Chapter XIV (pp. 120–121) includes notes on fungicides and their use against specific diseases and chapter XV (pp. 122–124) gives a routine spray calendar. The author urges all planters to familiarize themselves with the important principles of root disease control set out in chapter V.

SCHWARTZ (D.), CUZIN (J.), & RENIER (A.). **Influence des conditions d'éclairement du semis sur le taux de mosaïques dans une culture en plein champ.** [Influence of conditions of illumination of the seedbed on the incidence of mosaic in the field.]—*Ann. Inst. exp. Tab. Bergerac*, 1, 2, pp. 179–186, 1951. [Abs. in *Biol. Abstr.*, 26, 5, p. 1220, 1952.]

In studies on the influence of light and darkness on tobacco seedlings, some were subjected to a 48-hour period of darkness preceding transplantation, the seedlings then being set in a field infested with tobacco mosaic virus [at the Tobacco Experiment Station, Bergerac, France: *R.A.M.*, 32, p. 218 and next abstract] and inspected for symptoms 21 days later. The influence of heterogeneous infestation in the field, variations through the seed-bed, and individual influences of the workers transplanting the seedlings were largely eliminated. The results indicate that the favourable influence of previous exposure of seedlings to light on their resistance was significant, 2 per cent. of them showing mosaic infection against 4 per cent. of those kept in the dark.

Recherches cytogénétiques sur les Tabacs résistants à la mosaïque. [Cytogenetic researches on mosaic-resistant Tobaccos.]—*Mémor. Serv. Exploit. industr. Tab.* 1, 144 pp., 1949. [Abs. in *Plant Breed. Abstr.*, 20, 2, p. 324, 1950.]

In the work on breeding tobacco varieties resistant to tobacco mosaic virus now in progress in France [see preceding abstract] the characteristics, breeding behaviour, and degree of resistance of *Nicotiana glutinosa* × *N. sylvestris* × *N. tabacum* var. *purpurea*, *N. glutinosa* × *N. sylvestris* × *N. tabacum*, *N. tabacum* var. *purpurea* × *N. glutinosa*, and *N. tabacum* var. P.II × *N. glutinosa* are being carefully studied and recorded, valuable material for future selections based on further cytological studies being provided.

Malkiel (S.). **Immunochemical studies on Tobacco mosaic virus. VII. The quantitative precipitin reaction with equine antiserum. VIII. The specificity of chemically-altered virus.**—*J. Immunol.*, 69, 5, pp. 515–538, 3 graphs, 1952.

At the Allergy Research Laboratory, Northwestern University Medical School, Chicago, increasing amounts of tobacco mosaic virus antigen [cf. *R.A.M.*, 27, pp. 160, 161] added to a constant volume of immune equine serum produced corresponding increases of precipitate, reaching a maximum in the region of antigen excess. Maximal antibody precipitation occurs in the antibody-excess zone. The relationship is similar to that usually associated with rabbit antisera. The bulk of the equine antibody was found to be concentrated in the water-soluble fraction of globulin.

No significant difference was observed in serological reaction between native tobacco mosaic virus and acetyl, *p*-chlorobenzoyl, carbobenzoxy, reduced carbobenzoxy, acetylglycine-treated, and benzal derivatives of the virus when tested with antiserum to the native virus. Used as an antigen, tobacco mosaic virus-azo-arsanilic acid produced no specific haptenic antibody, but it did react with an antiserum to a heterologous azo-arsanilic derivative.

Jenkins (W. A.). **A lethal (virus) disease of fluecured Tobacco, new to the Old Belt.** —Abs. in *Phytopathology*, 42, 5, p. 284, 1952.

Tobacco plants of a strictly agronomic type have become affected [in Virginia] by a disease causing faint mottling on leaves immature at the time of infection and veinal necrosis which usually extends through the petiole into the cortex of the stem, producing sunken streaks throughout its length. Necrotic lesions develop on the older leaves, while very young ones and the flower buds turn black. Internal symptoms comprise necrosis of the stem and root cambium, accompanied by extensive patches of black, concentric rings in the pith. These features resemble those induced in *Nicotiana glutinosa* by tobacco mosaic virus, except for the leaf mosaic and absence of malformation. Necrosis, with or without mottling, or mottling alone develops within 10 to 14 days in inoculated field plants, confirming observations as to the introduction of the disease by topping and suckering operations. The results of these preliminary tests indicate that a virus complex may be involved in the etiology of the disease, or it may be due to the *Plantago* virus or another strain of tobacco mosaic virus causing necrosis in N^1N^1 varieties [cf. *R.A.M.*, 31, p. 462].

Ternovsky (M. F.). **Resistance to powdery mildew in vegetative hybrids of Tobacco.** Докл. Акад. Наук. СССР [*C.R. Acad. Sci. U.R.S.S.*], 80, p. 437, 1951. [Abs. in *Hort. Abstr.*, 22, 1, p. 93, 1952.]

The results of experiments with vegetative hybrids obtained by grafting tobacco varieties susceptible to powdery mildew (*Erysiphe cichoracearum*) [*R.A.M.*, 24, p. 122] on to immune varieties are described. The number of immune strains in the families from these hybrids was less than was obtained by sexual propagation although in the oldest generations the numbers tended to increase. Forms showing constant immunity in the fourth and fifth generations maintain this character in succeeding generations.

Un avvizzimento del Tabacco causato da 'Fusarium'. [A wilt of Tobacco caused by '*Fusarium*'.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 113–118, 5 figs., 1951.

Kentucky tobacco plants of all ages, in cutting, growing in the vicinity of Rome developed a serious wilt. Flaccid leaves became yellow, rolled at the margins, and began to dry, first at the tip then at the edges, and later between the veins, the

entire blade eventually becoming brown and brittle. Sometimes all the leaves withered simultaneously, but at others the basal leaves had completely withered while those at the apex, though wilting, were still green. The top of the stem was often bent over. In normal humidity conditions the withered leaves did not rot. Finally, the plant died. In many instances the leaves on only one side of a stem were affected, and in some cases only one or two files of leaves. Uncut Maryland tobacco growing a few yards away remained healthy.

A *Fusarium* sp. was found on affected material with conidia measuring 11 to 44 (mostly 30 to 33) by 3 to 7 (mostly 5 to 6) μ and chlamydospores approximately 8 μ in diameter. Control is recommended by improved cultural and sanitary practices. Further work is in progress.

KLINKOWSKI (M.) & USCHDRAWEIT (H. A.). **Die Bronzefleckenkrankheit der Tomate, eine bisher in Deutschland noch nicht beobachtete Viruskrankheit.** [Bronze spot disease of Tomato, a virus disease not hitherto observed in Germany.] —*Phytopath. Z.*, 19, 3, pp. 269–283, 4 figs., 1952.

In connexion with the recognition, in the early summer of 1950, of tomato spotted wilt virus on severely damaged and partially necrotic tomato plants submitted to the Saxony-Anhalt Plant Protection Bureau at Halle, the author summarizes essential information on the disease from 29 contributions to the literature. This is stated to be the first record of the virus on tomato in Germany [C.M.I. map No. 8].

GARDNER (E. J.). **Studies on the inheritance of resistance to curly top and vitamin C content in Tomatoes.**—*Proc. Utah Acad. Sci.*, 27/28 (*1949–51*), pp. 69–70, 1952.

Approximately 1 per cent. of more than 700 hybrids from crosses between *Lycopersicum pimpinellifolium* and commercial tomato varieties made at Utah State Agricultural College were susceptible to [beet] curly top [virus: *R.A.M.*, 32, pp. 66, 219] and 20 per cent. of the commercial varieties showed symptoms. It appears, therefore, that some progress may be expected in breeding for resistance to this disease [ibid., 27, pp. 118, 224].

COSTA (A. S.). **Necrose acrópeta do Tomateiro, de origem genética.** [Acropetal necrosis of the Tomato of genetic origin.]—*Bragantia*, 11, 4–6, pp. 93–97, 1 fig., 1951. [English summary. Received February, 1953.]

The symptoms of a form of acropetal necrosis observed at the Agronomic Institute, Campinas, São Paulo, Brazil, among plants derived from crosses between tomato and *Lycopersicum pimpinellifolium* are closely similar to those caused by virus infection, comprising necrotic lesions with concentric zonation, concentric rings, and leaf-drop. However, attempts to transmit the disorder by mechanical methods and grafting were unsuccessful. Studies on the mode of inheritance of the anomaly indicated that it is controlled by a dominant factor *N*, normal plants being *nn*. No correlation could be established between the intensity of necrosis and the hetero- or homozygous condition of the plants in respect of *N*.

MCCOLLOCH (L. P.) & WORTHINGTON (J. T.). **Low temperature as a factor in the susceptibility of mature-green Tomatoes to Alternaria rot.**—*Phytopathology*, 42, 8, pp. 425–427, 2 figs., 1 graph, 1952.

Alternaria tenuis is ordinarily unable to produce decay in healthy mature-green tomatoes [*R.A.M.*, 30, p. 589] and the occurrence of severe rotting by the fungus in certain commercial shipments pointed to low temperature as a possible factor in susceptibility. This hypothesis was supported by the results of inoculation tests at the Plant Industry Station, Beltsville, Maryland, on mature-green Rutgers

fruits held over a range from 32° to 70° F. for varying periods. The weakening of the host under the influence of low temperatures (from 50° downwards) is accompanied by a progressive increase in susceptibility to *A. tenuis*.

KERN (H.). **Über die Beziehungen zwischen dem Alkaloidgehalt verschiedener Tomatensorten und ihrer Resistenz gegen Fusarium lycopersici.** [On the relations between the alkaloid content of different Tomato varieties and their resistance to *Fusarium lycopersici*.]—*Phytopath. Z.*, 19, 3, pp. 351–382, 5 graphs, 1952.

At the Federal Technical Institute, Zürich, the author investigated the possibility of a connexion between the presence in tomato plants of the alkaloid-glucoside, tomatin [*R.A.M.*, 26, p. 118], and resistance to *Fusarium* [*bulbigenum* var.] *lycopersici* [ibid., 31, p. 636], three strains of which were supplied by the Plant Industry Station, Beltsville, Maryland, namely, the highly pathogenic R–5–6, the intermediate 280, and the weakly pathogenic 257. All the varieties tested, viz., Bonny Best, Trickswood, Rutgers, Marglobe, Pan America, and Red Currant (*Lycopersicum pimpinellifolium*), were more or less susceptible to each of the three isolates. The tomatin content of the roots and stems of different varieties ranged from 0·04 to 0·2 per cent. of the dry weight and that of the leaves from 0·2 to 2 per cent. Even at high concentrations the alkaloid was only slightly inhibitory to spore germination and mycelial growth, and there is no reason to suppose that it operates as a factor in resistance to wilt.

Toxin production by the three strains of *F. b.* var. *lycopersici in vitro* bore no relation to their pathogenicity *in vivo* and was effected largely by the young, rapidly growing mycelium during the first fortnight of culture. The process was not affected by tomatin and sap expressed from tomato plants. All the above-mentioned varieties were equally sensitive to the toxins of the wilt fungus, and there was no reciprocal inactivation between them and tomatin.

KUHNHOLTZ-LORDAT (G.). **Une attaque hypophylle du blanc du Chêne.** [A hypophyllous attack of Oak mildew.]—*Feuill. Nat.*, N.S., 6, 7–8, p. 96, 1951.

A serious attack of the conidial phase of oak mildew (*Microsphaera alphitoides*) [*R.A.M.*, 30, p. 128] on young offshoots of the common and sessile oaks in a very dry area of the moors of Lugos, Gironde, France, was entirely confined to clearly defined, red brown, transparent spots on the lower leaf surfaces only. The upper surfaces remained green.

BRETZ (T. W.). **The ascigerous stage of the Oak wilt fungus.**—*Phytopathology*, 42, 8, pp. 435–437, 1 fig., 1952.

Latin and English diagnoses are given of *Endoconidiophora fagacearum* n.sp., the ascigerous state of *Chalara quercina* [see following abstracts], a preliminary note on which has already appeared [*R.A.M.*, 31, p. 357]. The fungus has been assigned to *Endoconidiophora* following Davidson's treatment of the endoconidial group of the *Ceratostomella* complex [ibid., 22, p. 178]. The ascospores measure 5 to 10 by 2 to 3 μ.

HEPTING (G. H.), TOOLE (E. R.), & BOYCE (J. S.). **Sexuality in the Oak wilt fungus.**—*Phytopathology*, 42, 8, pp. 438–442, 1952.

In the authors' studies on sexuality in *Endoconidiophora fagacearum* [*R.A.M.*, 32, p. 110 and preceding and next abstracts], a preliminary note on which has already been published [ibid., 31, p. 408], several tissue isolates from one of the 29 oak trees tested in 28 separate infection areas in the southern Appalachian region of the United States produced perithecia without crossing. Monospore isolations

from these cultures were all self-sterile and it was shown that thalli of both compatibilities occurred in this tree.

Perithecia can be produced and the sex and compatibility of cultures determined in a few days, thereby facilitating investigations on the function of the perfect state in the spread of the wilt. The perithecia, moreover, yield ascospores of both compatibility types.

WENT (JOHANNA C.). **Boomziekten in de Verenigde Staten. Studierapport.** [Tree diseases in the United States. Study report.]—47 pp., 17 figs., 's-Gravenhage, Contactgroep Opvoering Productiviteit, [? 1952. English summary. Multilithed.]

During a visit to the United States from 31st July to 6th October, 1951, the author investigated a number of important tree diseases in Washington, D.C., and the States of Missouri, Wisconsin, Ohio, Connecticut, and North Carolina, and summarizes the information gained regarding each disease in this report. The disastrous effects of pathogens introduced from foreign countries or suddenly appearing for the first time were clearly apparent and point to the need for constant vigilance to exclude such diseases from Holland, particularly oak wilt (*Endoconidiophora fagacearum*) [see preceding abstracts]. Attention is drawn to the advisability of tests for phloem necrosis on elm selections [*R.A.M.*, 32, p. 43] which have shown resistance to Dutch elm disease [*Ceratostomella ulmi*] in the United States.

PUPILLO (M.) & CANOVA (A.). **Contributo alla conoscenza del 'mal dello stacco' dei Nocciòli in Sicilia.** [Contribution to the knowledge of 'bark flaking' disease of Hazel Nut trees in Sicily.]—*Ann. Sper. agr.*, N.S., 6, 4, pp. 895–906, 1 col. pl., 6 figs., 1 diag., 1952. [English summary.]

Hazel nut trees [*Corylus avellana*] in the provinces of Palermo, Messina, Catania, and Enna in Sicily are affected by a disease caused by a fungus which is provisionally identified as *Cytospora corylicola* [*R.A.M.*, 13, p. 66 and next abstract]. This disease, particularly severe and widespread in Enna, is one of the causes of a slow, progressive wilt. Reddish lesions up to 10 cm. wide appear on the bark, which is often cracked. Soon after, especially in favourable conditions of temperature and humidity, a red to orange mass of conidia emerges from the lesions. The whole cortical layer and much of the wood dies; the bark is brown and flattened and the wood very dark. As a result of arrested development of the necrotic tissues of older lesions a conspicuous depression eventually extends along their entire length. The distal parts of suckers with lesions are reduced in length. The most serious external symptom is a partial or complete breaking of the branches, which occurs when the necrosis has weakened the central cylinder. This nearly always happens at the point where infection started.

The fungus has hyaline pycnidioconidia 5 to 12 (mostly 7 to 8) μ in length. On malt agar the hyphae in young colonies are hyaline, 2 to 2·5 μ in diameter, and not much branched, while in old colonies they are profuse, brown, 3 to 3·5 μ in diameter, more branched and more septate. Pycnidia develop very sporadically and only in old cultures.

The fungus is a strongly pathogenic wound parasite, especially when favoured by environmental conditions and when the host is in a weakened state. Low temperatures favour pycnidial fructification and higher ones the growth of the mycelium in the host tissues. Humidity favours both.

All infected trees should be destroyed, orchards regularly inspected, and young branches showing the first signs of infection cut out, the wounds being disinfected with iron sulphate and cemented over. The same procedure should be adopted during winter pruning. In spring the trees should be sprayed with copper salts plus an adhesive. Further investigations are in progress.

Servazzi (O.). **Brevi notizie sulla 'moria' o 'seccume' del Nocciòlo Gentile delle Langhe.** [Brief notes on the 'decline' or 'withering' of Hazel Nut trees of the variety Gentile delle Langhe.]—*Nuovo G. bot. ital.*, N.S., 57, 4, pp. 679–682, 1950. [Received January, 1953. French, English, and German summaries.]

For several years hazel nut trees [*Corylus avellana*] in the region of Langhe, Piedmont, Italy, have been affected by a serious decline analogous to, if not identical with that reported from Spain [*R.A.M.*, 24, p. 475] and Sicily [see preceding abstract]. The most severely damaged area lay within the triangle formed by the districts of Vesime, Bubbio, and Roccaverano. The disorder was first reported in March, 1939, but local investigations indicate that it has been present for at least 20 years. Besides Gentile delle Langhe, the most commonly grown variety, it also attacks a variety known locally as Spanish hazel and probably imported some time ago from Catalonia. A shoot in full production may die in three to four years or sooner, while at Roccaverano trees of the Spanish variety having four or five suckers withered completely in two to three years.

The condition is probably caused primarily by excessive insolation on the relatively thin periderm of the suckers, death being due to invasion of the injured areas by a *Cytospora*, the one present in Sicily being provisionally identified as *C. corylicola* [loc. cit.].

Tryon (E. H.) & True (R. P.). **Blister-shake of Yellow-Poplar.**—*Bull. W. Va agric. Exp. Sta.* 350 T, 15 pp., 5 figs., 2 graphs, 1952.

Blister-shake is the name given to a defect, first observed in the summer of 1950 near Morgantown, West Virginia, in the basal part of the trunks of yellow poplars [*Liriodendron tulipifera*], characterized by separation cavities in the annual rings. It is interpreted as a result of frost damage causing bark blisters in earlier years.

Chavency (A.). **L'Abrasin en Indo-Chine.** [Tung in Indo-China.]—*Agron. trop.*, 7, 6, pp. 567–588, 2 figs., 4 maps, 1952.

In the section of this paper dealing with diseases (p. 574) it is stated that the cryptogams attacking tung (*Aleurites montana*) in Indo-China are relatively more dangerous than insects. Pathogens, in addition to those previously described [*R.A.M.*, 15, p. 271], include fungi causing root mortality such as *Fomes lignosus* [ibid., 29, p. 293], *Poria hypolateritia* [ibid., 13, p. 78], and *Ganoderma pseudoferreum*; *Ustulina maxima* [cf. ibid., 19, p. 626] and *Phytophthora 'omnivora'* [cf. ibid., 11, p. 509; 28, p. 365] attacking the collar; and *Rhizoctonia* [*Corticium*] *solani* causing mortality in the nursery. Stumps are sometimes attacked by *Botryodiplodia theobromae* [ibid., 15, p. 271] which gains entry through stem wounds. Leaf infections include *Gloeosporium aleuriticum* [cf. ibid., 28, p. 365] and *Bacterium* [*Pseudomonas*] *aleuritidis* [loc. cit.].

Pupillo (M.) & Di Caro (S.). **Alcune osservazioni sulle Septoria del Pistachio.** [Some observations on the *Septoria* on Pistachio.]—*Ann. Sper. agr.*, N.S., 6, 3, pp. 623–634, 6 figs., 1 graph, 1952. [English summary.]

In 1950 *Pistacia vera* seedlings growing in an experimental plot at Acireale, Italy, developed a serious leaf spotting due to *Septoria pistaciae* [*R.A.M.*, 13, p. 424; 15, p. 556; 30, p. 62] and *S. pistacina* [ibid., 6, p. 627]. The disease appeared early in May as small, mostly interveinal, circular or elliptical, well defined spots averaging 1 to 2 mm. in diameter, dark chestnut brown with a rusty halo, isolated or confluent, and scattered over both surfaces of the leaf. In severe cases they covered

two-thirds of the leaf blade, large areas of which subsequently withered. Spots were often present on the stalks.

The hyaline mycelium of *S. pistaciae* becomes intensely olivaceous brown with age with hyphae up to 3 to 6 μ wide. The dark type was the only kind found in the host tissues. The amphigenous, subepidermal pycnidia measured 70 to 90 by 60 to 85 μ. The conidiophores were mostly 30 μ long and 3 to 4 μ wide and the conidia, usually uni- or bi-, occasionally tri-septate, mostly measured 20 by 1·5 to 2 μ.

The mycelium of *S. pistacina* also consisted of hyaline and brown hyphae, the former being very similar to that of *S. pistaciae*, but the dark kind was more branched, rather wider, had septa which were closer together, a double wall, and an ochraceous-brown colour. The pycnidia measured 90 to 160 by 150 to 220 μ, and the conidiophores averaged 35 to 40 by 4 to 5 μ, bearing variously shaped, curved or straight, 4- to 8-celled conidia with one or both extremities rounded, and measuring 30 to 50 by 2 to 3 μ. As *S. pistaciarum* [ibid., 16, p. 230] appears to differ from *S. pistacina* only in the size of the conidia which, though reaching 80 μ, are within the limits observed for *S. pistacina* in culture on potato dextrose agar, it is considered synonymous with *S. pistacina*.

The disease may have serious results on the trees. Control consists in spraying with copper sulphate before and during growth and removing badly infected branches.

FRITZ (CLARA W.). **Brown stain in Pine sapwood caused by Cytospora sp.**—*Canad. J. Bot.*, 30, 4, pp. 349–359, 3 pl., 1952.

A fungus isolated from naturally brown-stained sapwood of red pine (*Pinus resinosa*) and jack pine (*P. banksiana*) logs and poles in Eastern Canada during storage and found occasionally in eastern white pine (*P. strobus*) was identified as *Cytospora* sp. [*R.A.M.*, 30, p. 206]. The characteristic chocolate brown stain was produced in sterilized red pine sapwood in culture. The fungus develops in the ray parenchyma and may proliferate in the tracheids, but penetrates the walls only through the pits. A technique is described for producing brown stain in culture in sticks of the size required for static bending and toughness tests. Each test was carried out on two series of end-matched sticks in groups of three, comprising a green control, sterilized control, and specimen stained in culture by *Cytospora* sp. A statistical analysis of the results indicated that the effect of the fungus on both bending strength and toughness is negligible.

Distribution Maps of Plant Diseases.—Maps 241–264. Issued by the Commonwealth Mycological Institute, 1952. 6*s*. 0*d*.

The eleventh year's issue of this series of maps showing the world distribution of major crop diseases [cf. *R.A.M.*, 31, p. 160] comprises (No. 241) *Erwinia ananas* and (242) *Pseudomonas ananas* on pineapple, (243) *Ceratophorum setosum* on *Crotalaria*, *Cytisus*, and *Lupinus* spp., (244) *Ceratophorum albizziae* on *Albizzia* spp., (245) *Mauginiella scaettae* on date palm, (246) *Monilochaetes infuscans* on sweet potato, (247) *Cercospora theae* on tea, (248) *C. capsici* on chilli (*Capsicum* spp.), (249) *Trachysphaera fructigena* on cacao, (250) *Cephalosporium sacchari*, (251) *Cercospora vaginae*, and (252) *Ligniera vascularum* on sugar-cane, (253) *Pseudomonas pisi* on pea, etc., (254) *Chalara quercina* on oak, (255) *Pleocyta sacchari* and (256) *Cytospora sacchari* on sugar-cane, (257) *Helminthosporium turcicum* on maize and other Gramineae, (258) *Phakopsora desmium*, (259) *Ascochyta gossypii*, and (260) *Ramularia areola* on cotton, (261) beet yellows virus on beet, mangold, chard, and spinach, (262) lucerne dwarf virus on vine (Pierce's disease) and lucerne, (263) *A. imperfecta* on lucerne, and (264) *Xanthomonas translucens* var. *undulosa* on wheat, rye, and barley.